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OF THE
ASIATIC SOCIETY OF BENGAL,

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VOL. XVI.

PART I.—JANUARY TO JUNE, 1847.

“It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of Asia will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted; and it will die away if they shall entirely cease.”—SIR WM. JONES.

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ERRATA.

PART 1ST.

<i>Page</i>	<i>Line</i>	
301	12	for Triunba read Trúmba.
„	19	for Sherí at el Beitha read Sherí 'at el Beitha.
302	4	for Tarimyer read Tarmíyeh.
„	12	for Jeddiah read Jedidah.
„	18	for Jeddiah read Jedidah.
303	10	for After “When it bore East” read On the right bank, &c.
„	17	for Khiyat read Khayt.
„	24	for Jeddiah read Jedidah.
„	3	for (in note,) Keif read Kúf.
„	6	for Nhar read Nahr.
304	8	for bending read trending.
„	18	for Dojin read Doj'm.
„	3	of note, Seghimeh read Seghirmeh.
„	4	for Sir read Sú, and for Tau read Táúk.
„	67	for Hamria read Hamrín.
„	11	for Hamrool read Hamrín.
„	13	for Physens read Phycus.
„	„	Last of note, Opio read Opis.
305	23	for Daláhee and Lagros read Daláhu and Zagros.
„	24	for Malwujep read Malwíyeh.
306	28	for approached read approach.
„	29	for was read is.
307	1	for Síel el Azeez read Sid 't Azeez.
308	3 & 5	for Maluryeh read Malwíyeh.
309	9	for passing read passes.
„	25	for Malwúyeh read Malwíyeh.
313	19	for Hebla read Kebla.
315	3	for round read mound.
„	6	for Shiragoor read Shirazoor.
„	2	of note, “Ustrima” read “Ustrina.”
„	13	for Sammariah read Samarrah.
„	18 & 22	for Dina read Dúra.
„	28	for Sammariah read Samarrah.
316	19	for this read thus.
„	24	for present read personal.
317	9	for Yet alij read Tel alij.
„	10	for Apis read Opis.
„	22	for Mahrwan read Nahrwán.
„	24	of note, for it read is.
„	29	for Zellar read Tellúl.
„	37	for Malwryeh read Malwíyeh.
318	17	for had read hove.
319	16 & 17	for after the numerals ^o and not t.
„	16	for Mahirgeh read Malwíyeh.

Page Line

- 319 21 for Abri Delif & Maluryeh read Abú Delif Malwiyeh.
 „ 24 for Majainmah read Majammah.
 „ 25 for On the east side, &c. read On the east side.
 „ 26 for Mahrwan read Nahrwán.
 322 12 of note, for analysis read anabasis.
 „ 23 for M. Batta read M. Botta.
 323 12 for Asperiall read Aspinal.
 „ 21 for “Durn” read “Dum.”
 325 25 for Tekritlis read Tekritlís.
 326 11 for “Al’arab” read “Al’Arab.”
 „ 14 for Tekrith read Tekritlís.
 „ 24 for a Scorpii read *a* Scorpií.
 „ 13 for Khanisah read Kanísah.
 327 2 for Arnin read a ruin.
 „ 3 for Kamsah read Kanísah.
 „ 4 for “El Tet’bha” read “El Fet’hha.”
 „ 6 for S. W. read N. W.
 „ 4 of note, for (Tageit) read (Tagrit).
 328 1 for easting read casting.
 „ 13 for Khalidj—fresh sentence, Observing, &c.
 „ 24 for Extending to the Eastd. read Extending to the Eastd.
 from it ;
 „ 1 of note, for “E. Seliva” read “El Selwa.”
 329 2 for Mejiris read Nejiris.
 „ „ for Nejin read Nej’m.
 „ 6 for gazing read grazing.
 „ 8 for tints read tents.
 330 6 for “El Tettha” read “El Fet’hha.”
 „ 9 for Makhal read Mak’húl.
 331 31 for Maluryah read Malwíyeh.
 „ 34 for Tholush read Tho’l’yeh.
 332 11 for Trumbee read Trúmba.
 „ 12 of note, for Al Athus read Al Athur.
 „ 14 for Bukhtyari read Bakhtiyári.

 ADDITIONAL ERRATA IN PART 2D.

- 614 16 for POTAMIDA read POTAMIDÆ.
 621 23 for *liporcatuſ* read *porosus*.
 623 note, for *Geckotidæ* read *Geckonidæ*.
 643 3 for on the Pinang read in the Pinang.
 656 5 for *Polycopodium* read *Polypodium*.
 909 14 for $3\frac{3}{8}$ inch read $0\frac{3}{8}$ inch.
 921 30 for HEXAHONOTUS read HEXAGONOTUS.
 927 6 for *catenularies* read *catenularis*.
 929 5 for Dryiphis read Dryiophis.
 1066 11 for *twelveth* read *twelcth*.

JOURNAL

OF THE

ASIATIC SOCIETY.

FEBRUARY, 1847.

Notices and Descriptions of various New or Little Known Species of Birds. By ED. BLYTH, Curator of the Asiatic Society's Museum.

[Continued from p. 313, *ante*.]

Hirundo, Lin. The following are the Indian Swallows hitherto ascertained.

1. *H. rustica*, Lin. This I have only seen from Nepal.*

2. *H. gutturalis*, Scopoli: *H. panayana*, Lath.; *H. javanica*, Sparrman; *H. jewan*, Sykes. The most common species of India generally, and of the Malay countries. Fine specimens only differ from the last in their smaller size. By far the finest which I have seen, is one in Dr. Cantor's collection from the Malayan Peninsula; the outer tail-feathers of which exceed the next by two inches and a half; but the wing measures only four inches and three-eighths, or less than in either of eight specimens, young and old, from Nepal and England, now before me of *H. rustica*.

* During a recent excursion to the Midnapore jungles, I procured a single specimen of *H. rustica*, in company with *H. gutturalis* and *H. daurica*; the last named species much predominating, conformably with Mr. Jerdon's observation of its haunts. Upon quitting the river alluvium, a marked change in the zoology of the country became at once apparent. *Pycnonotus flavivinctus* (the *Criniger Tickelli*, nobis, xiv, 571,) appeared in abundance; and the common Bengal Lark (*Alauda gulqula*) was no more seen or heard over the paddy-fields, while *Mirafra assamica* became replaced by *M. affinis*. In the jungles, *Palaornis torquatus* was completely replaced by

3. *H. domicola*, Jerdon : *H. javanica* apud Latham and Shaw.—Neilgherries, Malayan peninsula, Java. I was wrong in identifying this bird with the Australian *H. neoxena*, Gould, in XIV, 547: the latter is *H. pacifica*, Lath., and *H. javanica* apud Vigors and Horsfield. In a fine specimen before me, the wing measures four inches and one-eighth, and the outermost tail-feather nearly three inches, exceeding the next by an inch and a quarter; whereas among several specimens of *H. domicola* (from the three localities cited), the wing does not exceed three inches and seven-eighths, and the outermost tail-feather is at most but half an inch longer than the middle pair.

4. *H. filifera*, Stephens : *H. ruficeps*, Licht.; *H. flicauda*, Franklin : *Wire-tailed Swallow*, and the young—*Rufous-headed Swallow*, of Latham. Indian peninsula.

5. *H. daurica*, Lin. : *H. alpestris*, Pallas; *H. erythropygia*, Sykes; *H. nipalensis*, Hodgson. India generally; preferring the proximity of jungles (according to Mr. Jerdon): a casual and irregular visitant in Lower Bengal; but abundant in the Midnapore jungles, at least during the cold season.

P. cyanocephalus : *Bucco asiaticus* (v. *cyanops*, &c.,) by *B. zeylanicus* (v. *caniceps*): and the common Calcutta Crow (*Corvus splendens*) totally disappeared; its place being supplied by *C. culminatus*. *Picus mahrattensis* took the place of *P. Macei*. In lieu of the common Sparrow, the *Passer* (v. *Gymnoris*) *flavicollis*, with precisely the same note and manners, abounded upon the trees even near buildings, but without ever resorting to the latter. In the same trees were found *Piprisoma agile*, with the manners and note of a *Dicaeua*; and *Muscicapula melanoleuca* and *M. acornatus*: also *Athene radiatus*, but less numerously than the common *Ath. brama*. *Phyllornis aurifrons* and *Ph. Jerdoni* occurred, the latter very abundantly; the notes of both being remarkably similar to those of the *Dicruridae*: and their manners at once recalled those of *Iora*, to which genus *Phyllornis* is considerably allied. *Thamnobia cambaiensis* was also common; and the manners and actions of this species revealed its affinity for the Shâmah (*Kittacincla macrourus*): its tail is usually carried very high, or rather over the back, displaying the rufous under-coverts. The Shâmah was also obtained. *Buceros albirostris* was not rare, in small flocks; and *B. birostris* (v. *ginginianus*), in pairs: *B. pica* (v. *malabaricus*) was also to be met with. In large tracts of coppice jungle, the *Tuccocua affinis* (xv, 19,) or Rajmahl Sirkeer, occurred; and *Malacocercus* ? *hyperythrus*, (Franklin,) differing from its representative in S. India, was not uncommon; also a small *Prinia*, of which the young had been previously sent me by Mr. Jerdon. The *Drymoica sylvatica*, (Jerdon,) inhabited more open situations. On the bare 'kunkur' soil, near Midnapore, *Anthus rufulus* was procured, but much less abundantly than the common *Anth. malayensis*: *Lanius Hardwickii* was also obtained in that neighbourhood, with other Shrikes: and about the pretty rocky hill of Gope, in the same vicinity, *Ædicnemus crepitans* was particularly abundant. *Turtur senegalensis* was likewise obtained there. Nor was this trip less productive in other classes of animals; but details regarding these must be reserved.

6. *H. concolor*, Sykes. Indian peninsula.

7. *H. rupestris*, Scopoli: *H. rupicola*, Hodgson; *H. inornata*, Jerdon. Himalaya, Neilgherries.

8. *H. urbica*, Lin. Himalaya, Neilgherries.

9. *H. riparia*, Lin. Nepal, S. India. (*Non vidi.*)

10. *H. sinensis*, Gray, in Hardwicke's *Ill. Ind. Zool.*: *H. brevicaudata*, McClelland, *P. Z. S.* 1839, p. 156: *Indian Martin Swallow* of Latham. I think there can be no doubt that both the former names apply to the common little Indian Bank Martin, abundant along all the great rivers of the country, wherever the banks are sandy and high enough for them to perforate their nest-holes with tolerable security. The species is nearly allied to *H. riparia* in form, colour, and habits; but differs in its smaller size, less furcate tail, rather lighter colour, with the upper tail-coverts somewhat albescent, also in the breast being much paler, and in the absence of the downy tuft on the tarse just above the hind-toe, which invariably distinguishes *H. riparia*. Length of wing three inches and a half to three and three-quarters, and of middle tail-feathers an inch and a half. Whether these birds are migratory I am unaware. I have found both newly laid eggs and young ready to fly in the beginning of December, and also at the end of February. The nest-holes vary in depth from a foot and a half to considerably more, according as the banks are more or less hard; and the nest itself is composed of dry grass, with occasionally a few feathers in the lining: eggs pure white, like those of *H. riparia*; and the young have their upper feathers more or less margined with rufous, as in that species.

N. B. The *H. brevirostris*, McClelland, described with *H. brevicaudata*, I have identified as a *Collocalia* (XIV, note to p. 548), being the same as *H. unicolor*, Jerdon.

Of the various groups of Saxicoline Flycatchers, one genus makes a considerable approach to the Swallows. This is *Hemichelidon*, Hodgson, *Ann. Mag. N. H.* 1845, p. 203. The bill is absolutely as in *Hirundo*; and the wing reaches to two-thirds of the length of the tail, having the first primary minute, the second nearly equaling the fifth, and the third and fourth equal and longest: rest as in *Butalis*, but the tarse still shorter. Mr. Hodgson describes two species, *H. fuliginosa* and *H. ferruginea*. The former is com-

mon at Darjeeling, and the latter I have not yet seen. *H. fuliginosa* has the wing two inches and three-quarters long, and tail an inch and three-quarters. Colour plain fuliginous-brown above, paler below, albescent towards the vent and lower tail-coverts, and slightly on the throat: bill blackish above, the base of the lower mandible yellow; and feet brown. Young speckled with pale yellowish-brown, like a young Robin.*

Butalis, Boie, founded on the European *Muscicapa grisola*. This is another good genus, the species of which are distinguished by their plain olive or greyish colouring. The beak is more or less elongated and flattened, but in the Indian species is generally somewhat larger than in *B. grisola*: the feet are small and feeble; and the wings reach half-way down the tail, having their first primary short, the third and fourth sub-equal, and the second generally shorter than the fifth. Tail of mean length. All have the larger wing-feathers margined with pale buff externally.

1. *B. terricolor*, Hodgson, *n. s.* Plain uniform earthy-brown above, and whitish-brown below: the upper mandible dark, and the lower whitish except at its extreme tip: legs brown. Length about five inches and a half, of wing two and three-quarters, and tail two inches; bill to gape eleven-sixteenths, and tarse half an inch. The beak of this species is longer, broader, and also flatter, than in *B. grisola*. From Nepal.

2. *B. rufescens*, Jerdon, *n. s.* Very similar to the last, but distinguished by its general rufous tinge, and especially by its white legs and claws. Colour olive-brown above, tinged with rufous on the back, and more deeply so on the upper tail-coverts and margins of the caudal feathers; wing-coverts and tertiaries also margined with pale rufous: throat and fore-neck white, as also the anterior part of the lores, but a longitudinal patch of brown on each side of the throat; the breast, flanks, and under tail-coverts, brown, paler on the tail, and the belly whitish. Beak dark above, and yellowish-white below. Dimensions as in last. From S. India.

3. *B. ruficauda*, (Swainson), *Nat. Libr.*, 'Flycatchers,' *Appendix*. The beak of this species more resembles that of *B. grisola*, but is

* A species of this genus (apparently) is figured in one of Dr. McClelland's drawings of Assamese birds. Colour brown, paler below, whitish towards throat and vent: the secondaries and tertiaries margined with white, surrounding the tips of the latter.

longer; the feet are dusky-plumbeous; and the tail and its upper coverts are moderately bright rufous or ferruginous, suffused with dusky on the middle pair of tail-feathers, and on part of the outer margin of the next; rump also tinged with ferruginous; the rest of the upper-parts olivaceous, and the under-parts greyish, passing to white on the abdomen and chin; lower tail-coverts white, tinged faintly with ferruginous. Length about five inches and a half, of wing two and seven-eighths, and tail two and one-eighth; bill to gape three-quarters of an inch, and tarse five-eighths: the under mandible of the bill of this species has little trace of whitish. Hab. S. India.

4. *B. latirostris*, (Raffles, Swainson): *Muscicapa pöönensis*, Sykes. The beak of this species is shorter and broader than in the others, and much flattened. Length nearly five inches, of wing two and five-eighths, and tail an inch and seven-eighths; bill to gape eleven-sixteenths, and tarse half an inch. Colour greyish-brown above, sometimes a little tinged with rufescent; lower-parts white; the breast, flanks, and sides of the throat, light greyish-brown: bill dusky, except the base of the lower mandible, which is pale-yellowish; and the feet are dark brown: wing-coverts and tertiaries margined with light rufescent. Hab. S. India and Malay countries.

The following are two very distinct generic forms of Flycatchers, neither of which can be approximated to any other with which I am acquainted.

Muscitrea, nobis. Bill of moderate length, somewhat conical, a little compressed, the upper mandible obtusely angulated, with the curvature of its outline increasing to the tip, which overhangs that of the lower mandible, and is slightly emarginated; the extreme tip of the lower mandible also curves a little upward: gonys straight and scarcely inflected: the nostrils small, with anterior oval aperture, and beset at base with short reflected feathers and some incumbent hairs: a few fine hair-like bristles also at the gape, of moderate length. Tarsi moderately slender, as long as the middle toe with its claw; the toes and claws suited for perching. Wings long and broad, reaching more than half-way down the tail, having the fourth and fifth primaries equal and longest, the third rather shorter, the second equalling the eighth, and the first about half the length of the third. Tail moderately developed, its feathers of nearly equal length. The

general plumage inclines to be dense, and is unadorned with bright colours and glossless in the only known species.

M. cinerea, nobis. Length about six inches; of wing nearly three and a half; and tail two and a half: bill to forehead (through the feathers) five-eighths, and to gape three-quarters: tarse three-quarters of an inch. General colour ashy-brown above, greyer on the head, and tinged with fulvous on the exterior margins of the secondaries; beneath albescent, a little brown across the breast: bill light horn-colour; and feet have probably been bluish-leadens. From the Island of Ramree, Arracan, where discovered by Capt. Abbott.

Anthipes, nobis. This would probably be classed by Mr. Swainson with his *Fluvicolinæ*, or "Water-chats." With the general form of a *Pratincola*, it combines a Flycatcher's bill, and the toes and claws of an *Anthus* or Pipit. Beak flattened, rather wide at base, and narrowing evenly to the tip; the ridge of the upper mandible distinctly angulated, and its tip considerably overhanging that of the lower mandible, and (as usual in such cases) emarginated: nostrils basal, nearly closed by the membrane, their aperture a narrow lateral fissure: gape armed with fine but firm vibrissæ. Tarse slender, as long as the middle toe with its claw: the toes and claws suited for running, as in the Pipits; the middle front claw greatly exceeding the two lateral ones, and the hind claw as long as the toe, and but slightly curved, as are also the other claws. Wings moderate, rounded; the fourth, fifth, and sixth primaries sub-equal and longest, the third and seventh rather shorter, the second much shorter, and the first half the length of the second. Tail even, of moderate length, or somewhat short, the wings reaching half-way to its tip. Plumage full and dense.

A. gularis, nobis. Length four inches and a quarter; of wing two and three-eighths, and tail an inch and three-quarters: bill to forehead half an inch, and to gape five-eighths: tarse three-quarters, and hind-toe and claw the same. Upper-parts fulvescent olive-brown; the wings and tail inclining to dark ferruginous: lores conspicuously whitish, continued as a streak over but not beyond the eye: throat white, forming a large triangular patch, surrounded by a narrow black border; the breast and flanks fulvescent, and middle of the belly whitish. Bill black; and legs and claws pale. From Arracan, where discovered by Capt. Phayre.

The *Dimorpha?* *moniliger*, Hodgson, *Ann. Mag. N. H.* 1845, p. 196, would seem, from the description, to approximate the above species in its markings.

Zanthopygia, nobis. This is a genus of Chat-flycatchers, which I am not as yet prepared to approximate to any other. In the form of its beak, it bears much resemblance to the Australian genera *Eopsaltria* and *Petroica* (which branch off from *Pachycephala**), and also to the *Pratincolæ*; but of the two species to be described, the bill of the first is vertically deeper than that of the second, which renders generalization more difficult, although the generic identity of the two birds is unquestionable. Bill of mean length, acutely triangular as viewed from above, or much narrower than in the more characteristic Flycatchers; its upper ridge angulated, and the tip of the upper mandible incurved and emarginated: gape beset with fine hair-like vibrissæ. Tarsi and toes moderately small and weak, the tarse as long as the middle toe with its claw; wings reaching half-way down the tail, their first primary short, only a quarter the length of the second, which is shorter than the fifth, the third and fourth being subequal and longest. Tail of mean length. Plumage rather firm: the males black above, with yellow rump and under-parts, and a large white wing-spot. From Malasia.

Z. leucophrys, nobis. Length about five inches, of wing two and three-quarters, and tail an inch and three-quarters: bill to gape five-eighths, and tarse barely five-eighths of an inch. Colour deep black above, bright yellow below and on the rump; a large wing-spot, continued along two-thirds of the outer edge of the largest tertiary, also a spot before and over the eye, and the lower tail-coverts, pure white: bill dusky-horn or blackish, and legs brown. The female† differs widely in being of a light olive-green above, tinged with grey, especially

* *Timixos meruloides*, nobis, *J. A. S.* XI, 195, is *Pachycephala olivacea*, Vig. and Horsf.

† *Muscicapa zanthopygia*, A. Hay, *Madr. Journ.* No. XXXI, 162. The above description of the female is from his lordship's specimen; and Lord A. Hay's brief notice of the male in a foot-note, is from a specimen in the Society's museum, of which I have had a description by me in *MS.* for two years at least. His lordship, by a slip of the pen, referred to Dr. Cantor's fine collection of Malayan birds, as containing the male he had seen. Dr. C. has only a female, which accords with the description in the text, except perhaps in having the head less tinged with ashy.

upon the head ; below yellowish-albescent, the feathers of the fore-neck and breast margined with the hue of the upper-parts ; rump, towards the tail, bright and pure light yellow ; the two great ranges of wing-coverts tipped, and the tertiaries externally margined, with white : loral streak and the lower tail-coverts dull white : bill dusky above, below pale ; and the legs pale. From Malacca.

Z. chrysophrys, nobis. Differs from the preceding in its more slender and depressed bill ; in having a yellow supercilium continued back to the occiput ; in the white wing-spot not being continued along the edge of the tertiary ; and in the hue of the abdomen passing gradually to white from the bright yellow of the throat and breast. In other words, it may be briefly described as black, with yellow rump, supercilium, and under-parts, passing to white on the belly and lower tail-coverts, and a large patch of white upon the wing. Length of the wing three inches. The female I have not seen, nor am I aware of the habitat of the species ; but have some reason to suspect Australia, in which case it will probably bear a prior name.

A considerable group is formed by the various blue Flycatchers of India and Malasia, *minus* the *Myiogræ* (as exemplified by *M. cærulea*), which I have already approximated to *Tchitrea* (p. 290). At the head of them may be placed

Niltava, Hodgson, *Ind. Rev.* 1837, p. 650. In these beautiful birds, the *Muscicapa* structure is much reduced ; the bill being narrow and scarcely flattened, and the rictal bristles, though tolerably long, are very fine and slender. According to Mr. Hodgson, they "never seize on wing," but their affinities with the following groups are nevertheless obvious. Three species occur in the Himalaya, the two first appearing to be very common at Darjeeling.—1. *N. grandis*, nobis, XI, 189 (which Mr. Hodgson would separate by the name *Bainopus*, but I cannot understand upon what characters).—2. *N. sundara*, Hodgson.—3. *N. Macgregorii*, (Burton), *P. Z. S.* 1835, p. 152, v. *fuligiventer*, Hodgson ; which (as Lord A. Hay informs me) is common at Simla.

Cyanoptila, nobis. I found this group on a Javanese Flycatcher, which is just intermediate (both in form and colouring) to the preceding and following divisions, in neither of which it can be placed ; and it thus illustrates the affinities of *Niltava*. Its wings, however, are longer than in either, and more pointed, reaching fully

half-way down the tail ; and the beak is rather broader and flatter than in *Niltava*, but vertically deep, having the tomiae much inflected : rictal bristles small and inconspicuous. Rest as in *Stoporala* ; the frontal feathers deflected from the base of the bill, without any of the reflex velvety plumes conspicuous in *Niltava*.

C. cyanomelanura, (Tem.) Upper-parts deep Prussian-blue ; the crown and shoulder of the wing ultramarine ; and nearly half of the base of the tail pure white : lores, ear-coverts, throat and breast, blue-black ; belly and lower tail-coverts sullied white ; and flanks brown. Bill black ; and legs dark-coloured. Length of wing three inches and three-quarters ; of tail two and a half ; bill to frontal-feathers half an inch ; and tarse nine-sixteenths.

Stoporala, nobis. The type of this marked group is *St. melanops*, (Vigors), v. *Muscicapa lapis*, Lesson (*Rev. Zool. &c.* 1839, p. 104), and the female—*M. thalassina*, Swainson, *Nat. Libr. : Verditer Flycatcher* of Latham.—A second species, closely allied, inhabits Java ; differing in its smaller size, and deeper blue colouring : length of wing three inches, instead of three and three-eighths, and the rest in proportion.—A third, from Java, is *St. indigo*, (Horsf.), which in its white base of tail, the spreading of the loreal black on the chin and beneath the eye, and a little also in structure, approximates the *Cyanoptila*.—A fourth, allied to the last, especially in the white at the base of its caudal feathers, and in structure much resembling the first species, is *St. albicaudata*, (Jerdon), from the Neilgherries.

Siphia, Hodgson, *Ind. Rev.* 1837, p. 651. To this group may, I think, be referred—

1. *S. strophciata*, Hodgson, *Ind. Rev.* 1837, p. 651. Himalaya.

2. *S. leucura*, (Gm.): *Saxicola rubeculoides*, Sykes ; *Synornis jou-laimus*, Hodgson, *Ann. Mag. N. H.* 1845, p. 197 ; *Muscicapa parva* of India, apud Sundevall : *White-tailed Redbreast* of Latham, whose *Maculate Flycatcher* refers probably to the young. *N. B.*—Comparatively few specimens of this bird are procurable with the rufous throat. It inhabits India generally, visiting the plains in the cold season. From recollection, I should say that the European *Musc. parva*, Auctorum, is very nearly allied.

3. *S. erythaca*, nobis, *n. s.* Closely allied in form and structure to the last, but the whole throat, breast, and fore-part of the abdomen, bright yellowish-ferruginous; two narrow whitish bands across the wing, formed by the tips of the coverts; and the white on the sides of the base of the tail much reduced (as compared with the two preceding species), occupying only the extreme base of the outermost tail-feathers, and successively increasing in quantity upon the next four: belly and lower tail-coverts pure white; the flanks fulvous-brown: behind the eye a whitish spot: a slight olivaceous tinge on the upper-parts generally; and the tertials margined with whitish. Wing two inches and seven-eighths; tail an inch and seven-eighths; bill to gape nine-sixteenths of an inch, and tarse the same. The female is probably without the rufous on the under-parts, but would be distinguished from that of the preceding species by the narrow whitish bands on the wing, and also by the reduced quantity of white at the base of the tail. Inhabits the Malayan peninsula.

4. *S. leucomelanura*; *Digenea leucomelanura*, Hodgson, *Ann. Mag. N. H.* 1845, p. 197. Length five inches, or a little more; of wing two and three-eighths, and tail two and one-eighth; bill to gape nine-sixteenths; and tarse three-quarters of an inch. Above dark slaty-ash, having a blue tinge, the forehead and over the eyes vivid blue-grey; lores and ear-coverts black; middle of throat and fore-neck white, the rest of the under-parts whitish-grey; passing to white at the vent and on the lower tail-coverts; tail black, its basal half white, except on the two middle feathers, and on the inner web of the next to them. Bill dusky, and feet brown. This bird has somewhat the aspect, at first sight, of *Ianthia rufilatus* (p. 132), but is at once distinguished by its smaller size, shorter bill, duller colouring, the white upon the tail, and the absence of rufous on the flanks. Hab. Nepal.

5. *S. tricolor*; *Digenea tricolor*, Hodgson, *loc. cit.* Length about four inches and three-quarters, of wing two and a quarter, and tail two inches; bill to gape half an inch, and tarse five-eighths. Colour (of female?) olive-brown,* fulvescent on the rump; and passing to

* Mr. Hodgson says "olive-green;" but there is not the slightest tinge of green on the specimens with which he has favoured the Society, though these may possibly be females.

rufous-brown on the wings; tail dull ferruginous: under-parts light brown, inclining to albescent on the throat and belly: bill dusky, and legs brown. Young spotted above like a young Robin, or Stonechat, &c. Hab. Nepal.

6. *S. signata*; *Leiothrix signata*, McClelland and Horsfield, *P. Z. S.* 1839, p. 162, v. *Dimorpha** (alias *Siphia*) *auricularis*, (Hodgson), *J. A. S.* XII, 240. Himalaya, Assam.

7. *S. moniliger*, Hodgson, *Ann. Mag. Nat. Hist.* 1845, p. 197. (*Non vidi.*)

Muscicapula, nobis, XII, 939. This comprises—

1. *M. sapphira*, nobis.—2. *M. superciliaris*, (Jerdon), v. *Dimorpha albugularis*, nobis, XI, 190: *Lucknow Flycatcher* and *Azure Warbler*, Latham.—3. *M. hyperythra*, nobis, XI, 885, altered from *superciliaris*, nobis, XI, 190, and again by an oversight to *rubecula*, XII, 940; *Dimorpha rubrocyanea*, Hodgson, *Ann. Mag. N. H.* 1845, p. 197.—4. *M. melanoleuca*, (Hodg.), a name which will probably not stand, as the Society has received the identical species from Java, from which part M. Temminck also will probably have received and named it.†—In *M. sapphira*, the affinity to *Niltava*, *Cyanoptila*, &c., is still obvious in the colouring; and in *Siphia signata*, the general brown plumage is relieved by a patch of ultramarine-blue on each side of the neck, as in restricted *Niltava*, (or the *Neel-touns* of the Nepalese.) *M. melanoleuca*, as already remarked (XVII, 306), seems allied to *Hemipus*, Hodgson.

5. *M. acornaus*, (Hodgson); *Musc. pöonensis* apud nos, XI, 458. Length four inches and three-eighths, by six inches and three-quarters; of wing two and three-sixteenths to two and three-eighths; and of tail an inch and a half to one and three-quarters: bill to gape nine-sixteenths of an inch; and tarse somewhat more. Colour greyish-olive above, fulvescent on the rump, and rufescent-brown on the upper tail-coverts and margining the base of the tail-feathers; one Nepalese specimen has the upper tail-coverts ashy: lower-parts albescent-greyish, slightly tinged with fulvous in some specimens; the throat, middle of belly, and lower tail-coverts, dull white: axillaries pure white:

* *Dimorpha* is the name of an old genus in Botany.

† It is not rare in the Midnapore jungles; and Capt. Phayre had sent it from Arracan.

primaries dusky, the secondaries externally margined with olive, and the tertiaries with greyish or whitish-grey, becoming abraded on the worn plumage: greater coverts of the wing whitish-tipped, forming a slight wing-band. Bill blackish, and legs dusky or deep brown. The colour of this bird would ally it to *Butalis*, while its form is strictly that of *Muscicapula*.¹ It inhabits the S. E. Himalaya, and Central India: being not rare in the Midnapore jungles.

Cyornis, nobis, XII, 940. To this may be referred—

1. *C. rubeculoides*, (Vig.): *Niltava brevipes*, Hodgson, *Ind. Rev.* 1837, p. 651: *Ethereal Warbler* of Latham, and the female agrees with the supposed female of his *Blue Indian Warbler*. Inhabits all northern India, visiting the plains during the cold season. On the eastern side of the Bay of Bengal, it extends southward to the Tenasserim provinces; but in southern India is represented by the next.

2. *C. banyumas*, (Horsf.): *Muscicapa cantatrix*, Tem. Hab. Neilgherries, Java.

3. *C. elegans*, (Tem.), apud Strickland: *C. Tickelliae*, nobis; *Muscicapa hyacintha*, apud Tickell, and the female—*Musc. rubecula*, Swainson. Hab Central India—*N. B.* The *Blue Indian Warbler* of Latham would suit this species, except that the colour of the upper-parts is stated to be deep blue, instead of light greyish-blue, brighter on the forehead and shoulder of the wing.

4. *C. unicolor*, nobis, XII, 1007. Described from the imperfectly moulted young. The adult is a larger bird than either of its congeners, a male measuring nearly seven inches long, the wing three and a quarter, and the tail three inches. Colour a light smalt-blue, approaching to verditer above; the lower-parts paler, inclining to albescent below the breast: forehead and over the eye beautiful smalt-blue, as is also the shoulder of the wing: axillaries light rufescent, and a tinge of the same on the lower tail-coverts. From Darjeeling.

5. *C. pallipes*, (Jerdon), *Madr. Journ.* No. XXVI, 15. Neilgherries.

6. ? Probably *Muscicapa rufigastra*, Raffles, *Lin. Tr.* XIII, 312.

Ochromela, nobis. Nearly allied to the last group; but the Fly-catcher form of bill more pronounced, and the rictal vibrissæ longer; tarsi also rather longer, the wings more rounded, and the style of colouring altogether different—bright rusty, with black cap and wings,

in the only ascertained species—*Ochr. nigrorufa*, (Jerdon), *Madr. Journ.* No. XXV, 266, v. *Muscicapa rufula*, la Fresnaye. Hab. summit of Neilgherries.

Pratincola, Koch. The Chats.

1. *Pr. insignis*, Hodgson, *n. s.* General aspect much that of *Pr. rubicola*, from which it differs in its far superior size, white throat, and much larger white wing-spot. Length six inches and a half, of wing three and a half, and tail two and a quarter; bill to gape seven-eighths, and tarse an inch and one-eighth. Male (in summer dress) above black; the throat, sides of the neck, upper tail-coverts, a large longitudinal patch on the wings, together with the base of the primaries and greater portion of their larger coverts, white; breast bright ferruginous, the belly white, a little tinged with the same: bill and feet blackish. The female I have not seen. From Nepal.

2. *Pr. indica*, nobis, *n. s.* Closely allied to the European *Pr. rubicola*, with which it has been hitherto confounded: but distinguishable by its longer wing, averaging two inches and three-quarters; by the greater development of the white on the sides of the neck, which nearly passes round the nape, leaving a narrow dark interval (instead of a very broad one); and by the rufous-brown of the breast being much weaker, and paling laterally, the flanks being commonly very pale, and the lower tail-coverts pure white, or rarely a little sullied with brown: in winter dress, the dorsal edgings are very whitish in old males. The females, also (judging from memory of the European species), are altogether much paler. Common throughout India.*

3. *Pr. caprata*, (L.): *Saxicola fruticola*, Horsf.; *S. bicolor* et *S. erythropygia*, Sykes; *Motacilla sylvatica* (?), Tickell, II, 575. Common in most parts of the country, and esteemed by the natives as a cage bird; having a pleasing song, approaching to that of an English Robin, but more uniformly plaintive. It is termed by them *P'hidda*.

4. *Pr. ferrea*, Hodgson, *n. s.* A typical species, except that its tail is longer than usual in this group. Length about five inches and three-quarters, of which the tail measures two and a half; wing two inches and five-eighths; bill to gape five-eighths; and tarse seven-eighths. Upper-parts black, the feathers margined with ash-grey, the latter pre-

* In *Ann. Mag. N. H.* 1844, p. 410, Mr. Strickland has separated the S. African species previously confounded with *Pr. rubicola*, by the name *Pr. pastor*.

dominating on the rump; lores and ear-coverts black: throat, supercilium, and wing-spot, white; also the fore-neck, but the rest of the lower-parts tinged with ashy: tail black, its feathers narrowly margined with white externally, and the outermost pair (which are half an inch shorter than the middle ones,) for the most part partially albescent. Female rather smaller, and wholly brown above, passing to ferruginous on the upper tail-coverts, and there is an admixture of this colour on the rectrices: under-parts pale brown, rufescent on the flanks and lower tail-coverts, and whitish on the throat. Bill and feet black. Common in the eastern Himalaya.

Saxicola (?) pallida, nobis, n. s. This bird is essentially a Wheatear; but is remarkable for its large size, long bill, and short legs. Length nine inches; of wing four and three-quarters, and tail three and three-eighths; bill to gape an inch and a quarter; tarse the same. Colour (of female ?) light isabella-grey above, more fulvescent on the tertiaries and middle tail-feathers, which are shaded with pale dusky along the middle: lores, throat, and belly, whitish; the breast-feathers dusky, with broad whitish margins concealing the dark colour within: central ear-coverts pale, the rest nigrescent: wings internally white on the anterior half, the rest dusky; above the primaries and secondaries are white at base; and the shorter primaries are also white-tipped, the white increasing in quantity to the secondaries, which are broadly white-tipped; greater wing-coverts also white-tipped, forming a bar on the wing; and the small wing-coverts margined with pale fulvescent: tail, except its two middle feathers, dusky, the outermost having its narrow outer web almost wholly white, and the penultimate a narrow white edge to its outer web. Bill pale horny; and legs also pale. Inhabits Scinde (Ullah Bund), and the specimen described was presented to the Society by the Bombay branch of the Royal Asiatic Society of London.

Of typical Indian Wheatears, may be enumerated—

1. *S. stapazina* (?), Auct. Length about six inches and a half, of wing three and three-quarters, and tail two and a half; bill to gape three-quarters of an inch, and tarse an inch and one-sixteenth. General colour pale fawn (or isabelline) above, lighter below, and tinged with greyish on the crown and nape; throat, front and sides of the neck, including the lores and ear-coverts, black; wing also black, the coverts

slightly tipped, and the tertiaries margined with whitish, disappearing in the worn plumage; a considerable whitish patch at the base of the wing, ordinarily concealed beneath the scapularies; also an ill-defined whitish supercilium continued to the occiput, and contrasting with the black adjoining it below: upper and lower tail-coverts buffy-white; and base of tail pure white, its terminal two-thirds black. Bill and feet black. Common in the Upper Provinces, Scinde, &c. If new, *S. atrogularis*, nobis.

2. *S. leucomela*, Tem. Also common in the NW. of India.

3. *S. picata*, nobis, *n. s.* Merely differs from the last in having the crown of the head black, instead of white. For both sexes of this and of the preceding species, the Society is indebted to Capt. Boys, who procured them abundantly on the march from Scinde to Ferozepore. The present species is figured among Burnes' drawings, from Scinde.

4. *S. leucura*, (Shaw). This, again, only differs from *S. picata* in having the whole under-parts, as far as the vent, of a uniform black with the rest. Together with (supposed) *S. stapazina*, it is common about Agra, from which locality Dr. Stewart has presented the Society with fine specimens of both.*

N. B. The *Darunga Thrush* of Latham, obtained at Cawnpore in November, appears to me (judging from the description) to be a true Wheatear; and it certainly cannot be the *Merula Wardii* of Jerdon, to which that naturalist has referred it.†

Among Burnes' drawings, there is also a rude figure of what is probably *Sax. melanura*, Tem., a species described as inhabiting

* Stephens refers this to *S. cachinnans*, Tem.; but the latter is, I believe, the species figured by Savigny (*t. v., f. i.*), which differs from *S. leucura*, as *S. leucomela* differs from *S. picata*, in having a white cap. There are thus a white-capped and a black-capped species with white belly—*S. leucomela* and *S. picata*, and ditto ditto with black belly—*S. cachinnans* and *S. leucura*.

† "Length six inches at least. General colour of the bill, legs, and plumage, black; over the eye, from the nostrils towards the nape, a whitish streak, but ceasing before it reaches the latter; breast, belly and thighs, white, also the upper tail-coverts; the greater part of the tail from the base white, the side feathers being only tipped with black for half an inch; but the two middle feathers have their ends black for an inch and a half: the wings reach to more than half on the tail. Another, said to be a female, has the head and neck to the breast, and wings, and the whole of the two middle tail-feathers, dusky brown-black; on each jaw a large patch of deep black: breast, belly, thighs, and rump, upper and under tail-coverts, white; the two middle tail-feathers black; the rest white, except for about half an inch at the end."

Arabia. If rightly identified, however, this would seem to be a very aberrant Wheatear; and its colouring is much as in the female *Siphia leucura* (p. 125 ante).

Grandala calicolar, Hodgson, *J. A. S.* XII, 447. This very remarkable and (the male) most splendidly coloured bird, from the snow region of the Himalaya, appears to me to be decidedly allied to the Wheatears.

Ianthia, nobis: *Nemura*, Hodgson (a name long pre-occupied in entomology), *Ann. Mag. N. H.* 1845, p. 198. The birds of this division are closely allied to the Robins (*Erythaca*), from which they differ in their more delicate conformation, longer wings (reaching half-way down the tail), much weaker bill, longer and more slender claws—especially that of the hind-toe, and in the sexual diversity of colouring. The males (so far as known) are deep blue above, with lighter blue on the forehead and over the eye; and in the two first species (which are typical), this colour is confined to the rump and tail of the other sex.

1. *I. hyperythra*, nobis. Length about five inches and a half, of wing three and one-eighth, and tail two and a quarter; bill to gape nine-sixteenths, and tarse an inch. Upper-parts of male deep indigo-blue, brightening to ultramarine on the forehead and above the eyes, and upon the shoulder of the wing; the wings and tail black, the feathers margined with blue externally: lower-parts bright yellowish-ferruginous, confined to a narrowish streak on the middle of the throat and fore-neck; the lower tail-coverts and centre of the belly white. Female, a rich brown above, approaching to the colour of *Erythaca rubecula*, or rather the feathers are merely tipped with this colour, shewing more or less of the cinereous-dusky tint within: tail blue as in the male, the rump a lighter and more greyish-blue; there is also a little blue on the shoulder of the wing, and a greyish-blue supercilium brightening posteriorly: lower-parts tawney-brown, or subdued fulvous, except the lower tail-coverts which are white. Bill and feet dusky in both sexes. From Darjeeling.

2. *I. rufilatus*, (Hodgson), and the female—*Nemura cyanura*, Hodgson, *Ann. Mag. N. H.* 1845, p. 198. I suspect that the female of this bird is also the *Erythaca Tytleri* of Prof. Jameson, noticed (but not described) in the 'Transactions of the Wernerian Society,' and also in the 'Edinbro' Philosophical Journal' for July 1835, p. 214, where

it is mentioned to agree in the grouping of its colours with the Robin of Europe, but in the form of the bill to present as it were a link between the genera *Erythaca* and *Phœnicura*. The *Motacilla cyanura*, Gmelin, from Siberia, may refer to the female of either this or the preceding, or to that of some other equally allied species. Size and proportions of last, save that the tail is a quarter of an inch longer. The male has the upper-parts Prussian-blue, brightening and inclining to ultramarine upon the sides of the forehead over the eyes, on the shoulder of the wing, and on the rump: lower-parts white, confined to a narrow streak on the throat and fore-neck, but the flanks bright ferruginous: bill blackish, and legs dark brown. The female has the upper-parts uniform brown, with a trace of blue on the shoulder of the wing, a supercilium greyish-blue posteriorly, and russet margins to the tertiaries; tail blue as in the male, and the rump lighter and more greyish-blue: middle of belly, lower tail-coverts, and median line of throat, white; and the flanks bright ferruginous as in the other sex. This ferruginous colour of the flanks, with the hue of the upper-parts, produces a certain resemblance of colouring to the Robin of Europe, sufficient to have elicited the remark of Prof. Jameson. Inhabits the Himalaya generally, at least from Simla to Darjeeling.

3. *I. flavolivacea*, (Hodgson). I have little doubt that this is a female bird, distinguished from the females of the two preceding species by having no blue on its rump or tail. The tarse is longer than in the others, measuring an inch and one-eighth; wing two inches and seven-eighths; total length five and a half, of which the tail is two and a quarter. Upper-parts uniform brown, the loreal region and throat rufescent-white, and rest of the under-parts dilute rusty: bill dusky, the base of the lower mandible pale; and the legs pale. Described from Mr. Hodgson's only specimen.

Ruticilla, Brehm: *Phœnicura*, Swainson. The Redstarts. Of the typical members of this genus, the European *R. phœnicurus* was obtained by the late Sir A. Burnes on the banks of the Indus.*—2. *R. erythrogastra*, (Gould.): *Motacilla aureora*, Pallas; *Ph. Reevesii*, Gray, described in XII, 963. Inhabits Nepal and Assam, and extends from the Caucasus to Japan (as I am informed by Mr. Strickland, who also favoured me with its synonymes as here given).—3. *R. leucoptera*,

* The other European species, *R. tithys*, is common in Afghanistan.

nobis, XII, 962. This Malayan Redstart has lately been received by the Society from Java, two males and a female, so that it will probably have been named by M. Temminck :* the female is plain brown above, paler beneath, with rufous tail, and the same great white wing-spot as in the male.—4. *R. cæruleocephala*, Vigors : a typical species, but remarkable for not having the tail rufous as in the others. Himalaya.—5. *R. atrata*, (Latham) : the only Redstart which is diffused generally over the country.—6. *R. frontalis*, Vigors : apparently the most common of the Himalayan Redstarts, from Simla to Darjeeling ; and remarkable for its terminal black tail-band.—7. *R. fuliginosa*, (Vigors), v. *plumbea*, Gould. Rather an aberrant species, with small short bill ; and presenting a singular diversity in the plumage of the sexes,—the male being uniform dusky-grey, with dark ferruginous tail and coverts,—the female paler ashy, with whitish lower-parts, each feather margined with the colour of the back, and no rufous on the tail, which is white at base, extending over nearly the whole of its outermost feathers, and its upper and lower coverts also being pure white. From the Himalaya generally, and said to resemble the next species in its habits.

8. *R. leucocephala*, (Vigors and Gould), v. *Sylvia erythrogastra*, var. A, Lath., is the type of Mr. Hodgson's *Chæmorrhous*. The sexes are similar ; but I can perceive no structural distinction from the true Redstarts. This remarkable and beautiful species is stated, however, by Mr. Hodgson to differ considerably in habit from the latter, keeping always about mountain torrents ; and Captain Hutton writes me word, that it is very common in the valley of the Dhoon, and also in the hills along the banks of streams and rivers, “flitting from rock to rock and stone to stone, and eternally shaking its tail and spreading it by turns.” The last is a characteristic peculiarity of the true Redstarts ; and Lord A. Hay, who has obliged me with a similar account of the habits of this bird, sees nothing in them at variance with the generic habits of other *Ruticillæ*.

Calliope, Gould. The type of this group is the very Thrush-like (in structure and habits) *C. camtschatkensis*, (Gm.), v. *C. Lathamii*, Gould, and *Motacilla calliope*, Pallas. This bird is common in Lower Bengal during the cold season, and occurs in central India. A second

* Unless, as is not improbable, M. Temminck considers it to be a mere “climatal or local variety” of *R. phænicurus*.

species, with less firm plumage and rounder wings and tail, is *C. pectoralis*, Gould, figured by that naturalist in his *Icones Avium*: from the Himalaya. A third, referred by Mr. Jerdon and myself to this group, is *C. cyana*, v. *Larvivora cyana*, Hodgson, and *Phœnicura superciliaris*, Jerdon. Also from the Himalaya; and once obtained by Mr. Jerdon in the Neilgherries, and once by myself near Calcutta. In the Himalaya I am informed that it is common.

Larvivora brunnea, Hodgson, VI, 102, is probably but the female of *C. camtschatkensis*; and *C. cruralis*, nobis, XII, 933, is a typical *Brachypteryx*.

Tarsiger chrysæus, Hodgson, *Ann. Mag. N. H.* 1845, p. 198, and doubtfully referred to *Sericornis* of Gould, in XIV, 549, comes next in order:—and then the *Cyanecula suecica* (?), or Blue-breast, common in most parts of India; but whether absolutely identical with the European bird, I have some doubt, as its pectoral spot is always rufous instead of white. Can it be the species nearly allied to *suecica* mentioned by the Prince of Canino, in *Lin. Trans.* XIV, 754? *Cyanecula* has been merged in *Ruticilla* (v. *Phœnicura*) by many authors, though it has little in common with that genus beyond the rufous on its tail. * The typical Redstarts are sylvan birds, frequenting high trees, especially in rocky places or about buildings, and fond of singing from the topmost sprays; but which occasionally descend to the ground to feed, hopping about in the manner of a Robin. The Blue-breasts, on the contrary, affect the open country, where there are no trees, and especially reedy places, or plantations of sugar-cane, or growing corn or high grass, or ground covered with the broad leaves of cucurbitaceous plants; and there they are seen generally on the ground, running with alternate steps like a Pipit or Wagtail, and occasionally spreading wide the tail, displaying its rufous base to advantage; seldom perching, but flitting before you as you advance, and disappearing among the low cover; but soon coming forth when all is still, yet without absolutely quitting the shelter of the herbage by going more than a few paces from it. In Lower Bengal, these birds are extremely common in suitable situations. The Indian species is the *Blue-necked Warbler* of Latham, and his *Sylvia sperata*, var. A, is probably the female.

The following three genera are closely allied.

Sylvania, nobis. General characters of *Callene* (formerly *Cinclidium*, nobis, XI, 181*); but the bill much slenderer and straighter, resembling that of *Calliope camtschatkensis*, whereas the bill of *Callene* more resembles that of *Copsychus*, and especially *Notodela*.

S. phænicuroides, (Hodgson).† Length about seven inches and a quarter, of which the middle tail-feathers measure three and a quarter, the outermost nearly an inch less; wing two inches and seven-eighths; bill to gape seven-eighths; and tarse an inch and one-eighth. Upper-parts uniform dark cyaneous, or deep slaty-blue, less deep however than in *Callene frontalis*, or *Brachypteryx montana*; the lower similar but rather paler, passing into white on the middle of the belly; the winglet feathers are also tipped with white: tail black, all but its middle pair of feathers ferruginous for the basal half: bill dusky; and legs brown. Female rather smaller, and wholly brown above, paler brown below, passing to albescent along the middle of the belly; a slight tinge of rufous, but undefined, at the base of the caudal feathers. Inhabits Nepal.

Callene (olim Cinclidium) frontalis, nobis, figured in XII, 1010. This form differs from the next in its larger and stronger bill, more developed tail, and the somewhat scale-like character of its plumage;‡ but in other respects is hardly separable.

Brachypteryx, Horsfield. The Society having been favoured by the Natural History Society of Batavia with specimens of *Br. montana* and *Br. sepiaria*, Horsf., of Java, I am enabled to approximate very closely to the former species (which is the type of this genus,) the *Calliope? cruralis*, nobis, XII, 933, which merely differs from *Br. montana* in its somewhat smaller size, the absence of the mass of erect soft blackish plumelets on the forehead, and in the concealed white streak over the eye being continued forward to the nostrils. A second Indian species exists in the *Phænicura major*, Jerdon, of the Neilgherries, which, however, is less typical, and has the tail considerably more developed. *Br. sepium*, Horsfield, pertains to my genus *Alcippe*, as suggested in XIII, 284, and is very nearly allied to *A. poiocephala*, (Jerdon), and some

* The name *Cinclidium* was pre-applied in Botany to a genus of mosses.

† Mr. Hodgson refers this bird to *Bradyterus* of Swainson.

‡ Even this, however, occurs on the under-parts of *Br. cruralis*.

others. Lastly, Mr. Eyton, as noticed in XVII, 10, has recently assigned three Malacca species to *Brachypteryx*, all of which I had previously described and referred to *Timalia*, in which genus I would still decidedly retain them; and another of my *Timaliæ* he has classed in his *Malacopteron*, while he refers also to *Malacopteron* an unquestionable Bulboul, my *Ixidia cyaniventris*: *Br. nigrocapitata*, Eyton, *P. Z. S.* 1839, p. 103, has more the technical features of true *Brachypteryx*; but its affinities would seem to be rather with the *Malacopteron* series.

To *Brachypteryx* must also be approximated the curious little birds first classed by Mr. Hodgson under his *Tesia*, and of which he has since made two genera—*Pnoëpyga* and *Oligura*, in *Ann. Mag. N. H.* 1845, p. 195. These I have also treated of in XIV, 586; and if the two sub-groups are to be separated, the name *Tesia* must be retained in lieu of *Oligura* for the one section (this containing the species at the head of those first described under that name), while *Microura* of Gould (unless pre-occupied)* must stand for *Pnoëpyga*, Hodgson, inasmuch as it was long previously applied to the same special group.† Three of the species referred to *Pnoëpyga* by Mr. Hodgson are merely varieties of one species, as shewn in XIV, 586.

T. (v. Oligura) auriceps, Hodgson, *n. s. (Non vidi.)* “Above flavescent-olive, below pure deep slaty; the cap golden-yellow: bill coral-red below, dusky above: legs dusky flesh-colour. Length three inches and a half; bill six-tenths of an inch; tail nine-tenths; wing an inch and two-tenths; tarse an inch; central toe and nail seven-tenths; head five-tenths. Hab. Sikim. The bill of this bird is depressed; rictus hispid; lateral toes unequal, the hind large; and nails acute: by all which marks, in common with *T. cyaniventer* and [*castaneo-coronata*, v.] *flaviventer*, the type is proved to be different from [*Microura*, v.] *Pnoëpyga*.” Hodgson’s *MS.*

* It is, I find, pre-occupied by Ehrenberg, for a genus of *Vermes*.

† *Aipenumia* of Swainson, described in the Appendix to Vol. II of the *Fauna Americana-borealis*, certainly refers to these birds, comprehending, I think, both groups; and it is of prior application by many years to the other names: but which of the sub-groups it should be retained for is uncertain, as Mr. S. refers to undescribed species only. *Tesia* of Hodgson, as originally proposed, would in such case be quite synonymous; and if *Aipenumia* be restored, it might therefore be substituted for *Tesia* in the more limited sense of the latter appellation.

Whether the genus *Horeites*, Hodgson, should accompany *Tesia* and *Microura* in the approximation of these latter to *Brachypteryx*, will admit of considerable doubt.

From the *Brachypteryx* series, we might now pass to what have been called the Myiotherine birds; and thence by the vast series of forms comprised under Swainson's *Crateropodinae*: but some important groups must intervene; and, first, the four following allied genera—

Notodela, Lesson. This, I very strongly suspect, is identical with *Muscisylvia*, Hodgson, *Ann. Mag. N. H.* 1845, p. 197.* The beak, and even the colouring of the head, of the Himalayan species very closely resemble those of *Callene frontalis*; but the rest of the structure approximates these birds to the Dhyals (*Copsychus*), and even the beak merely differs in being smaller. To particularize further, the general structure is that of *Copsychus*, but less robust, with a nearly square tail, of which the outermost pairs of feathers graduate but slightly: the bill is smaller, and the tarsi and toes are more slender, than in *Copsychus*, with longer and more gracile claws, especially that of the hind-toe: wings reaching half-way down the tail, and having the fifth primary longest, the first about two-fifths the length of the fifth, and the second, third, and fourth, graduating in a successively decreasing ratio. If correctly brought together, two species will have been ascertained.

1. *N. diana*, Lesson, *Zool. du Voyage de M. Belanger*: respecting which I quote the following from my notes, not having the work to refer to. Length eight inches; bill to gape eight lines; and tarse ten lines. Plumage deep brownish-blue, relieved on the forehead by a satiny-white crescent. From Pegu.

2. *N. leucura*, (Hodgson). Length about seven inches and a half, of wing three and three-quarters, and tail three and a quarter; bill to gape seven-eighths, and tarse an inch; hind-toe three-eighths of an inch. General colour dark blackish indigo-blue; the forehead and over the eyes, and the shoulder of the wing, bright smalt-blue; alars and caudals dull black, except the basal portion of the external web of the three tail-feathers on each side next to the outermost feathers, the quantity of this white increasing outwardly: a concealed white spot on the sides of the neck in the male: bill and feet black. According to

* This name is, besides, too like *Muscylvia* of Lesson.

Mr. Hodgson, it "inhabits the mountains solely: is chiefly arboreal: and feeds on caterpillars, grubs and soft insects, and equally on pulpy berries."

Copsychus, Wagler; *Dahila*, Hodgson. The *D'hya*ls. Of this genus, the Bengal and common Indian species is *Gryllivora intermedia*, Swainson, and *Dahila docilis*, Hodgson, *As. Res.* XIX, 189. In this the females have, constantly, the whole upper-parts glossy ash colour, blackening on the middle tail-feathers; while the females of the two following have, as invariably, the upper-parts glossy black, though less intense than in the male, and passing to blackish-ashy on the forehead; now this latter agrees with Edwards' description of the female of his 'Little Indian Pie,' which, however, he adds, was sent from Bengal; and upon Edwards' figure is founded *Gracula saularis* of Linnæus. Perhaps, therefore, it will be as well to consider the Bengal bird as *C. saularis*, (Lin.), in conformity with recent systematists. The Ceylon D'hya would seem to be *Gryllivora brevirostra*, Sw., having a rather smaller bill than that of continental India, and the males of both have the four outer tail-feathers on each side white, the fourth, however, having commonly some slight admixture of black, while in the females the fourth has, generally, even more black than white. The Malayan D'hya is *Gr. magnirostra*, Sw., having a conspicuously larger bill than in the others, and never more than the tip of the fourth tail-feather white, and a good deal of black often on the third. It will range as *C. mindanensis*, (Gm.), v. *Turdus amœnus*, Horsf., and *Lanius musicus*, Raffles. Mr. Swainson also describes a *Gr. rosea*; respecting which Mr. Strickland writes me word, after examining Swainson's original specimen, that it "is certainly only *C. mindanensis* (v. *magnirostra*, Sw.), with plumage slightly stained by some rufous material, probably the red soil of some locality."

Kittacincta macrourus, (Gm.), Gould: *Gryllivora longicauda*, Swainson. The Shâmah. This splendid singing bird seems to be common in the hill jungles of Central India, and those at the foot of the Himalaya; and it is especially numerous in the territories eastward of the Bay, and in the Malay countries generally: but in the south of India it is somewhat rare.

Thamnobia, Swainson: *Saxicoloides*, Lesson. There are two species of this genus: that of Upper India, *Th. cambaiensis*, (Lath.), the

female of which is *S. erythrurus* of Lesson, has constantly the head and upper-parts of the male olive-brown; while in that of Southern India, the head and upper-parts of the male are shining deep black, the same as the under-parts,—this latter being *Motacilla fulicata*, Lin., *Ænanthe ptygmatura*, Vieillot, *Th. leucoptera*, Swainson, *Rusty-vented Thrush*, and the female—*Sylvia fulicata*, var. A, of Latham. The females of the two species are, however, undistinguishable; and I have observed that the younger males of *Th. fulicata* have the upper-parts more or less brown, as in the northern species, the head more especially; but the dorsal plumage (so far as I have seen) is always shining black underneath, and the brown edgings are cast after a while, leaving a more or less perfect black surface. The northern species, on the contrary, has no black on the interior of its feathers. This bird is the *Motacilla fulicata* of Tickell's list, and it abounds in all Upper India: I have never seen it from below the Rajmahl hills in Bengal, but it is common in the Midnapore jungles.

We may now venture on the great series of Indian Thrushes, which are as follow:

Zoothera, Vigors, *Proc. Zool. Soc.* 1831, p. 172.

1. *Z. monticola*, Vigors, *ibid.*; Gould's 'Century,' pl. XXII. The figure cited of this bird is faulty, making the body appear much too large; the legs and toes are also represented too stout and *terrene* in their character; and even the beak is incorrectly drawn, being too deep at base, instead of the culmen rising from the base and becoming deepest about the middle. In the young, the bill is not longer than that of an ordinary Thrush, but there are indications of its future form; and the plumage of the nestling much resembles the corresponding garb of an English Blackbird. In fact, the *Zoothera* is merely a stout Thrush allied to the *Oreocincla* of Gould, with a strangely overgrown bill; but this could never be inferred from Gould's figure of it. A specimen from Arracan is perhaps distinct, or it may be only the ordinary female: it differs from several Darjeeling specimens (males?) in its rather smaller size and less developed bill, in the olive-brown hue of its whole upper-parts, in having a distinct whitish loreal streak and much intermixture of the same upon the ear-coverts, and in the feathers of the under-parts being whitish with a broad olive-coloured border, surrounding the feather more or less according to the part. Inhabits the Himalaya; and

if that of the Arracan mountains prove identical, as is most probable, it may be expected to occur likewise in those of Assam, Munneepore, Sylhet, &c.*

Oreocincla, Gould, *P. Z. S.* 1837, p. 145. The more characteristic species of this group make a very close approach to the preceding, insomuch that there is hardly any difference between the bill of the Arracan specimen of presumed *Z. monticola* above described, and that of a Neilgherry near ally to *O. varia*, except that in the latter the culmen scarcely ascends from the base, while in other specimens of *Oreocincla* it distinctly ascends. Again, *O. macrorhyncha*, Gould, (*P. Z. S.* 1835, p. 145), from New Zealand, is described to be nearly allied to *O. varia*, from which it differs "in the much larger size of the bill, and in the deeper black colouring of the margins of the feathers;" so that it is even probable that the dividing line cannot be drawn between the two groups, especially as the black margins to the feathers of the upper-parts, which are especially characteristic of most of the *Oreocinclæ*, do not occur in all of them, as for example the species which I introduce next.

2. *O. moltissima*, nobis, XI, 188: *O. rostrata*, Hodgson, *Ann. Mag. N. H.* 1845, p. 326. In some specimens of this bird, the beak appears abnormally grown out, and altogether coarser than in that which I originally described; and Mr. Hodgson's *O. rostrata* is founded upon an example of the kind: but I have recently examined a fine series of specimens, which has shewn their identity beyond a doubt. They commonly measure from ten to eleven inches in total length; and some have the wing-coverts broadly tipped with pale fulvous of which no trace occurs in others. Common in the vicinity of Darjeeling.

3. *O. neilgherriensis*, nobis, *n. s.* This species was originally sent me by Mr. Jerdon as the *Turdus varius* of his catalogue, which latter he has lately referred to *O. dauma* (*Madr. Journ.* No. XXXI, 127); but he has since obtained additional examples of the present species, which is conspicuously distinct from *O. dauma*. From the Javanese *O.*

* A second specimen from Arracan accords with the above description, except that its size is fully equal to that of the Himalayan bird; its beak, however, being rather smaller. This disposes me to the opinion that it is distinct, in which case I propose for it the name *Z. marginata*. One or the other of these birds was procured by Dr. McClelland in Assam; apparently the Arracan species, to judge from the drawing.

varia, it differs (judging both from recollection of Javanese specimens and from comparison with Dr. Horsfield's figure,) in having much shorter and smaller tarsi. The plumage would, however, appear to be the same: and the beak is particularly long and coarse, having absolutely the character of *Zoothera* but little subdued. Length about ten inches, of wing five and a quarter, and tail three and a half; bill to gape an inch and a half, and tarse but an inch and one-eighth; middle toe and claw one and a quarter: the first primary an inch and three-eighths, and the second three-eighths of an inch shorter than the third, fourth, and fifth, which are equal. From the Neilgherries.

O. varia, (Horsfield,) *Lin. Trans.* XIII, 149; *Zool. Res. in Java*, with coloured figure. Malay countries.

4. *O. dauma*,* (Lath.), Strickland, *in epistolâ: Turdus Whitei*, Eyton; *O. parvirostris*, Gould, *P. Z. S.* 1837, p 136 (a small female). From the numerous specimens which I have seen, I feel convinced that Mr. Gould's *O. parvirostris* may be referred as above. The species appears to be common in the Himalaya, and can hardly be considered rare in Lower Bengal during the cold season, when it is generally met with among bamboos. It also occurs in central and southern India: and, as a rare and accidental straggler, has been met with in South Britain and Ireland, and some other parts of the west of Europe. The beak of *O. dauma* is that of an ordinary *Turdus*, and its colouring only refers it to the present group.

5. *O. spiloptera*, nobis, *n. s.* Length about eight inches and a half, of wing four inches, and tail three and a quarter: bill to gape above an inch, and tarse an inch and a quarter. Colour uniform rich olive-brown above, inclining to tawney; below white, with black spots nearly resembling those of the Missel Thrush: middle of throat, lower abdomen, vent and lower tail-coverts, spotless: wing-coverts black, margined more or less with the hue of the back, and each conspicuously tipped with a pure white spot. Bill blackish, and very robust: the tarsi brown and slender. Inhabits Ceylon.

Turdus, L., as restricted

6. *T. viscivorus*, Lin. The European Missel Thrush is common in the N. W. Himalaya.

* Intended for *Dâma*, the Hindoostanee equivalent for *Thrush*.

7. *T. atrogularis*, Tem.: *T. Naumanni* apud nos, XI, 189: *Rychill Thrush*, Lath., the female. Common in the Himalaya, and I have also seen it from Tipperah.

8. *T. Naumanni*, Tem. A very rare species in the Himalaya. The following appears to be the female. Length about eight inches and a half; of wing five inches, and tail three and a half; bill to gape an inch and one-eighth; and tarse the same. Upper-parts ruddy-brown, the crown and ear-coverts dusky, with a whitish supercilium as in *T. iliacus*; throat and middle of belly white, the feathers of the sides of the throat marked with a dusky medial line, and the breast and flanks brown, with a pale margin to each feather; sides of the neck below the ear-coverts whitish; the under-surface of the wing chiefly buff, with the fore-part and the axillaries ferruginous: bill yellow with dusky tip; and legs brown. From Chusan, where collected by Dr. Playfair, Surgeon of the Phlegethon War Steamer, and presented to the Society by Dr. McClelland.

9. *T. ruficollis*, Pallas. Nearly allied to *T. atrogularis*, from which it differs in having the fore-neck and breast, supercilium, fore-part of the under-surface of the wing, and the tail except partially at tip, ferruginous; lores, under the eye-streak, dusky; and under-parts below the breast white, a little sullied with light brown. In what appear to be the females, the throat is albescent, with rufous lines, and striæ of dusky spots on each side; the eye-streak also is whitish; the ferruginous colour of the breast weaker, with pale terminal margins to the feathers; and there is more dusky and less rufous on the tail. Bill dusky, with more or less yellow at the base of the mandibles, the lower being sometimes chiefly of this hue: and legs pale brown. Length about ten inches, of wing five to five and a half, and tail four inches; bill to gape an inch and one-eighth, and tarse one and a quarter. Inhabits the Himalaya.

T. javanicus, Horsfield, *Lin. Tr.* XIII, 148: *T. concolor*, Tem., *p. c.* Java. This and *Oreocinclla varia*, are the only true Meruline species included in Dr. Horsfield's long list of Javanese *Turdi*.

10. *T. rufulus*, Drapiez, *Dict. Class. d'Hist. Nat.* X, 443: *T. modestus*, Eyton, *P. Z. S.* 1839, p. 103. Length eight and a half to nine inches, of wing four and a half to five inches, and tail three and a quarter to three and a half; bill to gape an inch; and tarse one and

a quarter. Upper-parts greenish olive-brown, with a dull whitish supercilium; chin, and generally the medial portion of the throat, with the belly and lower tail-coverts, white; breast and flanks brownish-fulvous, brighter in old males; the throat and fore-neck streaked laterally with olivaceous, which in some specimens crosses the breast above the fulvous hue, and is more or less ashy; others again, evidently the old males, have the entire crown and neck all round, of a dusky-ash colour, mingled with white on the middle of the throat. Bill dusky above, the basal two-thirds of the lower mandible yellow; and legs pale brown. The wings of this species are firm and acuminate, and the tail also is firm. It inhabits the eastern coast of the Bay of Bengal, from Arracan to the Straits of Malacca, becoming more numerous southward; and M. Drapiez mentions having received it from Java, where it is a periodical visitant, and named (as he informs us) *Striée*.

11. *T. unicolor*, Tickell, *J. A. S.* II, 577; also of Gould, *P. Z. S.* 1837, p. 136. Length about nine inches, of wing four inches and five-eighths, and tail three and a half; bill to gape above an inch; and tarse exceeding an inch and one-sixteenth. Colour uniform dark ashy above, paler below, and passing to white on the belly and lower tail-coverts; a tinge of rufous on the fore-part of the wing underneath. Bill yellow; and legs duller yellow. Capt. Tickell describes the female to be "dirty-grey, mixed on the back with olive, tinged on the head with brown. Wings and tail brownish; coverts of tail iron-grey; breast isabella-grey, belly white." What Mr. Gould describes as the young, appears to me to be the female of the next species: and he also states the bill and legs to be livid fuscous: the length of wing he gives, "three inches and a quarter," must be a misprint for five and a quarter; though that would exceed, by more than half an inch, the length of wing of the only specimen before me. The species inhabits the Himalaya chiefly, but occurs sometimes in central India.

12. *T. dissimilis*, nobis: *T. unicolor* et *T. modestus*, nobis, *passim*, as in XI, 460, &c.: *Calcutta Thrush*, Latham, the female. This bird, as well as the preceding one, is very closely allied to the succeeding group, *Geocichla*; and the mature male of the present species has the whole under-parts from the breast, except the medial line of the belly and the lower tail-coverts, which are pure white, of the same bright ferruginous colour as in *G. citrinus*, *G. cyanotus*, &c.

An approach to the same colouration is exhibited by old males of *T. rufulus*. The female, however, shews no sign of this except on the axillaries, and on more or less of the under-surface of the wing : yet, before obtaining the male, I had perceived the affinity of this species for the *Geocichla* ; and it is curious that I procured some eight or ten in the feminine plumage (whether all females, however, I cannot say, for some were only skins), before I succeeded in getting a male, which, as I all along suspected, proved to be clad in not quite so homely a garb as his mate. The male is, indeed, rather a handsome Thrush. Length nine inches, by fourteen and a quarter in spread of wing ; closed wing four and a half ; tail three and one-eighth ; bill to gape an inch and one-eighth ; tarse the same. Colour of the upper-parts plain olive-brown in both sexes, with ashy beneath the surface of the feathers, tending a little to predominate about the rump ; throat, middle of belly, and lower tail-coverts, white ; the sides of the throat with dusky linear spots, more or less diffused, and some often appearing in the middle ; breast light olive-brown, with a few dusky spots, sometimes small and triangular, sometimes larger and more linear ; and the flanks spotless olive-brown in the female, and perhaps in the juvenescent male, but in the old male bright ferruginous, spreading to the white medial line of the abdomen. Beak dusky, with generally some intermixture of yellow ; and legs bright yellowish-brown. As in the *Geocichla*, the bill of a fresh specimen of this species is usually much clotted with mud ; and the bird, like them, is mostly seen on the ground, hopping about among the underwood. It is not rare in Lower Bengal during the cold season. Mr. Jerdon has lately obtained it in the south : and it often occurs in collections from the Himalaya.

Geocichla, Kuhl.

13. *G. cyanotus*, (Jardine and Selby), *Ill. Orn.*, 1st series, pl. XLVI. Common in the Indian peninsula.

14. *G. citrina*, (Lath.) : *Turdus Macei*, Vieillot ; *T. lividus*, Tickell, *J. A. S.* II, 577 ; *T. rubecula* apud Horsfield, *P. Z. S.* 1839, p. 161. Bengal, Nepal, Assam, Arracan, Central India. A very common species. The young, received from Darjeeling, has the upper-parts dull olive, with a pale rufescent central streak to each feather ; head and neck dull rufous, the feathers centred brighter, except towards the fore-

head ; under-parts light rufescent, deeper on the breast ; and wings and tail as in the adult, but the feathers centred and margined with rufous.

G. innotata, nobis, n. s. Resembles *G. citrina*, but has the ferruginous colour of the head and under-parts, and the ash-colour of its upper-parts, much more intense ; no white upon the wings ; and the lower tail-coverts only (not the vent) are white. From the Malayan Peninsula. What I take to be two females of the same species, from the Nicobar Islands, have the throat white, and some white at the sides of the vent ; the wings, rump, and tail, only, are deep ashy, the back and scapularies being olive-green, much as in the female of *G. citrina*. These are also smaller than the Malayan bird, the wing being but four inches, and the rest in proportion ; whereas the Malayan (supposed) male has the wing four inches and a half. Should the Nicobar bird prove distinct, it might stand as *G. albogularis*, nobis.

G. rubecula, Gould, *P. Z. S.* 1836, p. 7. It is not very clear, from Mr. Gould's description of this Javanese species, in what it differs from *G. citrina* ; except that he states the tarse to be an inch and a half long, instead of one and a quarter, and that the tail is but two inches and a half, instead of three inches ; but from the difference of locality, it will most likely prove to be distinct. Four well marked species of this group are, as Mr. Gould informs us, in the Zoological Society's Museum ; and *T. rufovariegatus*, Drapiez, *Dict. Class. d'Hist. Nat.* X, 465, would seem to belong to it.

Merula, Ray.

15. *M. Wardii*, Jerdon, *J. A. S.* XI, 882 ; Jerdon's *Ill. Ind. Orn.*, pl. VIII. The bird described and figured as above, is the male. The female is very differently coloured, and a specimen was sent by Mr. Hodgson by the name *Oreocincla? micropus*. The Society has also since received a female from Southern India, and a male from Almorah ; so that all doubt is removed concerning the identity of the Himalayan bird with that of Travancore, &c. The sexes of this species present the usual diversity observable in most of the black Merles, (as the British *M. vulgaris*, &c.), only somewhat further carried out ; and this particular difference of the sexes confirms the propriety of its allocation in *Merula*, which group, as I formerly remarked, it tends to connect with *Oreocincla*. The male is black, with white eye-streak

and under-parts from the breast, except the feathers of the flanks which are only margined with white; and, besides a white wing-patch under the scapularies, the wing-coverts and tertiaries are tipped with the same, and the secondaries and middle tail-feathers, with the upper tail-coverts, more slightly, the rest of the tail-feathers being successively more deeply so tipped, increasing in amount to the outermost. The female has the upper-parts brown instead of black, with slight whitish tips to the upper tail-coverts, and less white on the tail-feathers, which is also less pure; the wing-coverts are each tipped with a triangular spot of fulvous-white, and the tertiaries more slightly; the supercilium is also fulvous-white, and the entire under-parts, except the lower tail-coverts which are purer white, a little variegated with dusky; while the feathers of the throat, breast, and flanks, are each tipped with a transverse dusky spot, more or less triangular on those of the breast; axillaries chiefly pure white: bill and legs yellowish. In fact, if we except the eye-streak and the mottlings of the wings and tail, and also its smaller size, the female of this species resembles a good deal a pale and spotted-breasted hen English Blackbird. It seems to be far from being a common species in this country, though met with from the Himalaya to Travancore.

16. *M. bouboul*; *Lanius bouboul*, Lath.: *Turdus pæcilopterus*, Vigors, *P. Z. S.* 1831, p. 54; Gould's Century, pl. XIV. The black of this species is never so uniformly deep as in the European Blackbird, the under-parts of the old male being more or less brownish: in younger males, there is also a brown tinge above; the rump and upper tail-coverts incline to ashy, and the lower-parts may be termed fuscous-brown: the wing-mark, too, is more albescent in old birds, thus contrasting stronger with the black of the rest of the plumage; while in younger specimens it is much browner. The brown colour of the females is more uniform than is represented on Gould's plate, and the wing-mark is certainly never of the decided rufous hue which is there laid on, having but a faint rufescent tinge, with the margins of the outer coverts dull albescent to a greater or less extent. In the spotted nestling garb, the sexes are already easily distinguishable, from the much darker tone of colouring in the males: besides that, in all the Thrush tribe, the great alars and caudals first put forth resemble in colouring, size, and firm texture, those of the adults, being not shed at the first

moult. This is the common Himalayan Blackbird of the lower ranges, or what is termed the sub-Himalayan region.

17. *M. albocincta*, (Royle); figured by the name *albicollis* on Royle's plate, which name was previously applied by Vieillot to a Brazilian species: *Turdus collaris*, Sorel, *Rev. Zool.*, 1840, p. 2. Size and proportions of the last species: the male black, tinged with brown underneath; throat and fore-neck white, surrounding the ear-coverts, and forming a broad collar round the neck: bill yellow, with dusky tip; and legs yellowish. Female brown, paler below; the collar greyish-brown, and throat white with some dusky spots, and a line of the same from the corner of the lower mandible. The White-collared Blackbird is confined to a greater elevation on the Himalaya than the preceding species.

18. *M. nigropileus*, (de la Fresnaye); described in M. Adolphe Delessert's *Souvenirs d'un Voyage de l'Inde*, Pt. II, p. 27. Length about ten inches, of wing five, and tail four; bill to gape an inch and a quarter, and to forehead an inch; and tarse an inch and three-sixteenths. Cap, including lores and cheeks, black; chin washed with the same: the back and rump, wings, and tail, dark fuscous-ashy, tinged with brown on the interscapularies: the neck all round, and the underparts, ashy-brown, paler on the belly, and passing to white at the vent: under tail-coverts mingled white and ashy: bill, and apparently round the eye, yellow; and legs yellowish-brown. Female altogether paler, the white of the vent spreading over much of the abdominal region, and the cap dusky-brown instead of black. Inhabits the Neilgherries, and is occasionally met with on the eastern ghats.

19. *M. brachypus*, nobis: *Black-crowned Thrush*, Latham, from Ceylon. This bird is almost exactly similar to the female of the last, except that the dark cap is less pronounced, and the abdominal region and under tail-coverts are merely pale: but the tarse is remarkably short, not exceeding an inch; and the tail is perfectly squared, whilst in *M. nigropileus* its outermost feathers are three-eighths of an inch shorter than the middle ones. These two characters are so marked that I have no doubt of its distinctness. It was obtained, I believe, in the Neilgherries, by Mr. Jerdon.

20. *M. simillima*, (Jerdon), *Madr. Journ.* No. XXV, 253. Smaller than the English Blackbird, with longer bill, and yellow legs: the

black of the male much less deep, and tinged with ashy ; and the lower-parts paler and brownish. Female paler and browner, as usual, passing to ashy on the rump and upper tail-coverts, and with the lower-parts still lighter-coloured. Proportions of *M. nigropileus*, but the tail-feathers broader and considerably less firm towards their tips ; the beak is also conspicuously longer, measuring to gape an inch and three-eighths : and the colouring is much the same as in *M. nigropileus*, but the contrasting ashy and brown are softened down almost to homogeneity. Inhabits the Neilgherries ; being the species referred by some authors to the European Blackbird, which it resembles in its song : the latter species is common in Afghanistan.

21. *M. castanea*, Gould, *P. Z. S.* 1835, p. 185. Length about eleven inches, of wing five and a half, and tail four inches ; bill to gape one and a quarter, and tarse the same. Colour a bay-chesnut, darkening on the interscapularies, and paler below ; the head and neck grey, darker on the crown, and albescent on the throat and fore-neck ; wings dusky, the tertiaries partly margined with brown ; and the tail blackish, its lower coverts mingled deep black and white : bill yellow, and legs yellowish. The female has all the colours less intense, the wings and tail brown, and the lower tail-coverts mingled brown and white : bill chiefly dusky. Himalaya. This species is nearly allied to *M. albocincta*.

22. *M. leucogaster*, nobis, *n. s.* I only know this from a well executed drawing prepared by the late Dr. Griffith, during his journey from Assam to Ava, and now in the possession of Dr. McClelland : there can be no doubt of its distinctness as a species. Colour slaty-black, the lores, throat, fore-neck, and breast, deep black, and the belly dull white. Length about nine inches and a half, of wing five and a quarter, and tail above four inches ; bill to gape an inch and a quarter, and tarse the same.

Petrocincla, Vigors. Rock Thrushes.

23. *P. erythrogastra*, (Vigors), *P. Z. S.* 1831, p. 171 ; Gould's 'Century,' pl. XIII : *P. rufiventris*,* Jardine and Selby, *Ill. Orn.*, 1st series, pl. CXXIX. The two figures here cited shew what different representations may be made of the same species, provided the true

* There is also a *Turdus rufiventris*, Vieillot, from Brazil.

colouring be not rigorously adhered to: thus Mr. Gould has coloured it with a black throat and fore-neck, adding a slight gloss of blue; and the other naturalists cited have coloured these parts entirely blue, with a white margin separating them from the blue of the rest of the neck. Now the true colouring of the throat and fore-neck is a dull blue, with occasionally a medial rufous patch on the latter, and the feathers being margined with pale greyish; the latter accounts for the white border assigned by Sir W. Jardine and Mr. Selby: again, the latter naturalists have coloured the tail much too blue, and have also exaggerated the edgings of the wing-feathers, which edging might indeed be erased altogether: the back, too, should have been rendered much darker and more dingy than the head and rump, which, with the shoulder of the wing, are alone bright blue; and the lores, ear-coverts, and sides of the neck, are black, contrasting with the blue of the crown, and passing into the dusky-bluish of the fore-neck. The females vary a good deal, but have always a much greater admixture of black on the lower-parts and sides of the throat, than is shewn in Gould's figure of this sex; the ground hue is often, but not always, much more rufous; and though there is generally a pale mesial space on the throat and fore-neck, even this is in some specimens wholly variegated with the black margins to the feathers. The sexes of the young are conspicuously different in the nestling plumage, from the young males having the wings and tail blue, which in the females are brown, as in the adults respectively; and the pale central spots to the clothing plumage are also much more rufescent in the young males, and albescent in the young females. Common in the Himalaya.

24. *P. longirostris*, nobis, *n. s.* This species I only know from a female, presented to the Society by Captain Boys, who procured it on the march from Scinde to Ferozepore. It is remarkable for the length of its bill, and for the pale greyish colour of its upper-parts, which would indicate that the blue of the male is considerably paler than in the three following species. Length about eight inches and a half, of wing four and a quarter, and tail three and a quarter; bill to gape an inch and three-eighths, and tarse an inch. Upper-parts light brownish-grey, browner on the wings, and greyer on the tail; the lower-parts pale fulvescent-grey, obscurely marked with dusky; bill blackish, and

legs brown. Very distinct from the females of the three following species.*

25. *P. affinis*, nobis, XII, 177 (*bis*). Rare at Darjeeling; but common along the eastern side of the Bay of Bengal, from Tipperah and Arracan to the Tenasserim Provinces. The males of this species have generally some intermixture of rufous about the vent and lower tail-coverts, varying in quantity, but seldom nearly so much as in *P. manillensis*; whereas in *P. pandoo*, I believe there is never a trace of this rufous.† The females are altogether bluer than those of *P. pandoo*, especially on the upper-parts; and the under-parts, the feathers of which are margined with black as in the rest of the group, have the ground-tint more or less rufescent. It is decidedly a distinct species from the next.

26. *P. pandoo*, Sykes, the male; *P. maal*, Sykes, the female: *Turdus solitarius*, var. A, Latham. Inhabits central, western, and southern India. The general plumage of this species is always less distinctly mottled than that of the preceding one, both above and below; this distinction being very obvious when several specimens of both are seen together: and in *P. manillensis* the feathers are much more mottled than in *P. affinis*. I allude to the margining of the feathers, which have subterminal blackish bars, edged with whitish; but which in *P. pandoo* are so slight as to be scarcely noticeable, while in *P. manillensis* they may be said to ocellate the whole plumage more or less, and in *P. affinis* they are constantly intermediate. *P. manillensis* is also of a lighter blue than the two others.

P. manillensis, (Gm.) Inhabits the Philippines and China. The male of this species appears to have constantly the whole abdominal region deep rufo-ferruginous, the feathers margined as above described; and the female has the pale rufescent hue of the lower-parts more predominant, with a slighter dusky margin to each feather: tail perfectly

* Can this be *P. cyanea* of Europe? Lord A. Hay has procured a species in Kashmir, which he thinks is the European one; and various other European birds occur there, as *Corvus monedula* and *Coracias garrula*, which (as his lordship informs me) abound in the valley of Kashmir.

† A Tenasserim specimen just received has much more rufous on the abdomen than I ever observed before in *P. affinis*; but its distinctness from *P. manillensis* is nevertheless obvious. This bird likewise inhabits Assam; and the Society has just received a specimen of it from Goalpara.

squared ; whereas in *P. pandoo* the outermost rectrices are a trifle shorter than the rest, and in *P. affinis* they are a good deal shorter, the penultimate and ante-penultimate also graduating.

Monticola, Brehm : *Petrophila*, Swainson ; *Orocetes*, G. R. Gray.

27. *M. cinclorhyncha*, (Vigors) : *O. cyanocephala*, Swainson : *Black-collared Thrush*, var. A, Latham. The members of this group are of a shorter make, and more Chat-like, than those of the preceding one, with greater variegation in the colouring. The Indian species is perfectly true to the type of the European *M. saxatilis*, which is the standard of the division. In this bird the sexes, as I have been informed, resemble each other ; but such is not always the case, for a female in the Society's collection is very similar to the female of *M. saxatilis*, though differing of course in not having the tail rufous, nor the indication of the white mark on the croup of the male *M. saxatilis*, as also in its under-parts being less rufescent. In both species, the female plumage is of the same general character as in the female *Petrocincla*. The young also are similarly much spotted with pale fulvescent ; the young males of *M. cinclorhyncha* being distinguished from the other sex by possessing the white spot upon the wing, the same as in the sexes of the Stone Chat (*Pratincola rubicola*), while also in nestling plumage. The present species is a hill—but not a rock—bird, frequenting the tops of trees in the forests : and it extends its range to all India in suitable localities ; being met with occasionally, but rarely, in the plains during the seasons of passage, at which period (that of vernal migration) I once obtained one in the vicinity of Calcutta, which I kept for some time alive. Its song is sweet, plaintive, and tolerably loud ; delivered in the manner of a Robin's song : and its manners are very like those of a Stone Chat.

The *Turdus eremita*, Gm., founded on *le Merle solitaire de Manille* of Buffon, would seem to be the female of a species of this division, and not (as I suggested in XII, 182,) that of *Petrocincla manillensis*, both sexes of which are figured in the *Planches Enluminées*.

From the Thrushes, we may pass to the Myiotherine birds of Swainson, leading to his *Thamnophilinæ* : a great series of forms, more especially developed in South America. In India, we have

Cinclus, Bechst. The Dippers. One species, confined to the Himalayan torrents, and which was originally discovered in the Crimea,—*C.*

Pallasii, Tem., figured in Gould's 'Century.' Allied to this is *C. americanus*, Say, of the Rocky Mountains of North America. Of the third and well known European species, *C. aquaticus*, found also in Western Asia, Mr. Yarrell states that the sexes are alike in plumage; but in specimens of this bird in the Society's Museum, from England and Norway, there is a very marked sexual diversity, such as described in Fleming's 'British Animals.'

Brachyurus, Thunberg: *Pitta*, Vieillot. There are at least four marked sub-groups comprehended under this genus, as follow:—1. *Paludicola*, Hodgson; a name pre-occupied for a genus of reptiles. To this must be referred *Myiothera cærulea*, Raffles, v. *Pitta gigas*, Tem., from Malacca and Sumatra: and *Pal. nipalensis*, Hodgson, from Nepal, Darjeeling, and Arracan.—2. The group exemplified by *Myiothera affinis*, Horsf., v. *Pitta cyanura*, Tem.; to which, as an aberrant species, may be referred *P. cyanea*, nobis, XII, 1008, from Arracan and Tenasserim. The affinity of these two species is more obvious in the female sex. Fine specimens of *Br. cyaneus* are more brilliant than those formerly described from, each feather of the breast and belly being of a beautiful light blue, with a round subterminal black spot and bars above this. The female is blue only on the tail, but with an admixture of this hue on the dull greenish back.—3. The form of *P. granatina*, Tem., v. *coccinea*, Eyton: with very long tarse, short wings, &c.—4. The ordinary *Brachyuri*, of which three species are admissible into the *Fauna Indica*: viz. *Br. triostegus*, (Sparrman), v. *malaccensis*,* (Scop.), v. *superciliaris*, (Wagler, after Sonnerat, *Voy. aux Indes Orient.*, pl. 110), also *abdominalis*, (Wagler, after Edwards, pl. 324), and *Pitta brachyura* apud Vigors, Gould, and others, which name applies to an allied species from the Philippines. This is the common Indian species, and the only one found generally over the country from the Himalaya to Ceylon, and which is occasionally to be obtained near Calcutta, as in the Botanic Garden; but I have never seen it from the eastward of the Bay of Bengal.—*Br. cyanopterus*, (Tem.), v. *malaccensis* apud nos, XII, 960: common in the countries eastward of the Bay, from Arracan to Malacca:—and *Br. cucullatus*, (Hartlaub), v.

* This specific name has the priority; but as the bird does not inhabit the Malayan Peninsula, it is a misnomer that cannot be retained. To Mr. Strickland I am indebted for several of the above cited synonyms.

nigricollis, nobis, XII, 960, and *rodogaster*, Hodg., *ibid.* (the young): found in Nepal and Assam, as well as in the vicinity of the Straits.

Myiophonus, Tem. Two Indian species, both figured in Gould's 'Century of Himalayan birds.' *M. Temminckii* is indeed common throughout the Himalaya, frequenting the beds of streams in the lower ranges; and its musical whistle (according to Mr. Vigne,) is the sweetest note heard in the hills: but *M. Horsfieldi* is confined exclusively to the mountainous parts of Southern India. Two other species occur in Java, *M. cyaneus*, (Horsfield), v. *glauцинus*, Tem.; and *M. flavirostris*, (Horsfield), v. *metallicus*, Tem. A fifth would seem to exist in *le Merle bleu de la Chine* of Sonnerat, v. *Gracula cærulea*, Scop., and *Turdus violaceus*, Lath. Mr. Swainson also mentions *M. nitidus*, Gray; but this is probably one of the two Indian species already referred to.

The great series of South American *Myiotherinæ* seems to grade completely into the *Thamnophilinæ* or Bush Shrikes of Swainson, inhabiting the same regions; but presents some forms which certainly approximate the *Brachyuri* of the Old World and Australia; and others again grade into the Wrens (*Troglodytes*), also chiefly an American group, but which comprises a few Old World species, among which are two from the Himalaya described in XIV, 589. I now add a very distinct form, by the name

Rimator, nobis. The species upon which this division is founded is a very curious little Myiotherine bird, the immediate affinities of which are not obvious. Bill longer than the head, compressed, a little incurved, the curvature increasing to the tip where the extremity of the upper mandible passes and bends over that of the lower one, but without any well defined emargination; culmen rounded for the terminal two-thirds or more, but becoming angulated towards the base; and the tomia but little inflected: the nostrils pierced in an ovate basal membrane, their aperture being a little removed from the base of the bill: gape extending to beneath the fore-part of the eye, and unarmed, or having but a few short and inconspicuous hairs: legs moderately strong, suited for progression either upon the ground, or up the slanting bough of a tree; the tarse nearly as long as the middle toe with its claw, and having four long scutæ to the front, and two shorter ones below: toes rather long, the outer a trifle more so than the inner, and reaching to the base of the claw of the mid-toe: claws not much curved, that of the

hind-toe large, being twice the size of the middle front-claw. Wings much bowed and rounded, the first primary reaching to but half the length of the fifth, which equals the two next, and a little exceeds the fourth and eighth. The tail short and weak, its feathers slender and flexible, with soft tips a little pointed. Plumage lax, being excessively so and very copious over the rump.

R. malacoptilus, nobis. Length five inches, of which the tail measures one and a quarter, and the bill to forehead an inch; wing two inches and a quarter; tarse seven-eighths; and long hind-claw about three-eighths. Colour of the upper-parts deep brown, with pale shafts to the feathers, forming a central streak on those of the nape and back; scapularies and interscapularies black on the inner web, and brown on the outer; the mass of loose feathers on the rump brown, with light shafts more or less apparent; and the tail and large wing-feathers uniform deep brown with a slight ruddy tinge: under-parts pale brown, lightest on the middle of the breast and on the throat, and becoming whitish towards the chin; a black streak borders each side of the throat, which has also a few dusky specks; and the breast-feathers generally are margined, the lateral more broadly, with olive, which colour prevails and is tinged with ferruginous on the flanks; the lower tail-coverts being dark ferruginous. Bill dark horny, mingled with whitish; and legs light brown. From Darjeeling.

Another very distinct genus of the great *Myiotherine* series appears to me to exist in

Enicurus, Temminck. At least eight species may be enumerated, four pertaining to the Malayan fauna, and four to that of India.*

1. *E. ruficapillus*, Tem.: *Turdus avensis* (?), Gray, figured from a bad native drawing in Griffith's 'Animal Kingdom,' VI, 530. Inhabits Java. This fine species, while pre-eminently typical of its group, strongly exhibits in the form of its bill, and in the rufous colouring of its head and nape, the *Myiotherine* affinities of the genus, upon comparing it with such birds as the *Formicarius cayennensis* (Bodd.), v. *Myiocincla colma*, Swainson, &c. The bill is considerably longer and more slender than in the figure cited in Griffith's 'Animal Kingdom,'

* *Motacilla maderaspatana* (nec *madaraspatisensis*) of Latham is probably a ninth species. It is remarkable that none has hitherto been observed in the south of India.

with the upper mandible conspicuously hooked over at tip: much as in *Cinclus*, minus the hook and nareal orifices; and it is also the same form of bill which reappears in that very curious Malayan bird, the *Eupetes macrocerus* of Temminck. From the figure referred to, it differs in the white of the face being confined to a frontal crescent, each horn of which reaches to above the middle of the eye; in having narrow white tips to the tertiaries; and a forked tail of moderate length, with its two outer feathers on each side wholly white: the rufous of the nape should also spread a little lower down; the black of the fore-neck not so far; and beneath this, the pectoral feathers are each margined with black, as rudely represented in the figure of *Turdus avensis*. Length of wing three inches and a half; of outer tail-feathers three inches; bill to forehead above three-quarters; and of tarse an inch. It is a peculiarly interesting species, as indicating, more than either of the others, the affinities of its group.

2. *E. diadematus*, Tem. Of this species, from the mountainous interior of Sumatra, I have no description. It is probably identical with the only species I have yet seen from the Malayan peninsula, and which is remarkable for a triangular frontal crest of white feathers, evidently erectile, and those forming the apex being longer than the black coronal feathers they impend. Rest of the plumage black, with white lower abdomen, wing-band, rump, and two outermost tail-feathers on each side, the other tail-feathers white-tipped. Dimensions as in the preceding species: the young having the frontal crest much reduced. If distinct and new, *E. frontalis*, nobis.

3. *E. speciosus*, (Horsfield): *E. coronatus*, Tem. Inhabits Java.

4. *E. velatus*, Tem. Inhabits Java.

5. *E. maculatus*, Vigors; figured in Gould's 'Century': *E. fuliginosus*, Hodgson, *As. Res.* XIX, 190 (the young). A specimen forwarded to the Society's Museum by Mr. Hodgson with the latter name, I consider to be decidedly the immature dress of the present species: differing from the adult in the flimsy texture of its clothing plumage, in having the dark portion of its upper-parts spotless fuliginous-brown, with indistinct pale mesial lines, passing into white on the belly: wings as in the adult; tail wanting in the specimen. *E. maculatus* appears to be a very common Himalayan species, and occurs rarely in Arracan.

6. *E. immaculatus*, Hodgson, *As. Res.* XIX, 190. This resembles the next species, except in having the upper-parts deep black, where the other is slaty, and the tail seems to be constantly shorter; its outermost feathers not exceeding four inches and three-quarters in any that I have seen, whereas those of *E. schistaceus* measure commonly five inches and a half. A very rare species in Nepal; but common in Arracan.

7. *E. schistaceus*, Hodgson, *As. Res.* XIX, 191. A common species in the eastern Himalaya, and found likewise in the Tenasserim provinces.*

8. *E. Scouleri*, Vigors; figured in Gould's 'Century'. Himalaya; rarer to the westward. Remarkable for the shortness of its bill, and for having the tail scarcely furcate.

(*To be continued.*)

Bhāsha Parichéda, or Division of Language. A logical Treatise, translated from the Sanscrit, by E. ROER.

INTRODUCTION.

In the following introduction to a translation of the *Bhāsha Parichéda*, one of the most celebrated works of the *Nyāya* philosophy, it has been my endeavour to subject the logic of the *Nyāya*, as well as the leading ideas of this and the *Vāisheshika* systems, to a critical review, in order to bring the discussion about the merits of the philosophical researches of the Hindus more to a point. Colebrooke's exposition of the *Nyāya* and *Vāisheshika* systems, though founded on the ablest and most exact researches, as well in a philosophical as in a critical point of view, does

* It is probably Dr. W. Jameson's supposed new species, noticed in *Calc. Journ. Nat. Hist.* 1846, p. 360. I doubt whether many of that gentleman's Thibetan animals will prove so new as he imagines: *e. g.* his Marmot (p. 361), and the *Lagomys* (?) mentioned with it, &c. &c. The large Hare is doubtless *L. oistolus* (*v. tibetanus*): and I can already pronounce *Ovis ammon* to be distinct from *O. montana*.

not suffice for this purpose, as it is a mere abstract from the works of those schools, and does not enter upon the discussion of the position they are to hold as systems of philosophy.

It is perhaps not impossible to write a history of Indian philosophy, if it be limited to the task of tracing the gradual development of philosophical principles and modes of thinking, without reference to a strict chronological order; but as yet many more materials are required to complete a work, beset with so many difficulties. At the same time we must admit, that even in this attempt, with more ample materials, we can only partially succeed. The doctrines even of those who are considered as the founders of the different schools, bear the marks of a far advanced progress in systematical discussion, and must therefore have been the result of a long series of preceding philosophical enquiries. Hence it would be preposterous to expect, that we should be able to discover the first steps of their researches. We cannot, however, deem this a very great loss, as we have the first philosophical attempts of the Greeks, and we may safely affirm, that a great similarity must have obtained between both of them. We, however, decline here embarking upon any historical research, believing, that under the present circumstances, it is more important to place an original work of Hindu philosophy before the public, and to examine the principles under which it has been constructed. For this end we consider the Nyāya in that shape, which it has acquired by its amalgamation with the doctrines of the Vāishēshikas, since we are of Colebrooke's opinion, that both sprang from the same root, and are but branches of the same school; the one being directed more to the explanation of material, the other of logical forms.* Or to state it more exactly,—to the Nyāya belong the logical doctrines of the forms of syllogisms, terms and propositions; to the Vāishēshika the systematical explanation of the categories (the simplest metaphysical ideas) of the metaphysical, physical, and psychical notions, which notions are hardly touched upon in Goûtama's (the supposed founder of the Nyāya) Sūtras. They differ in their statement of the several modes of proof; the Nyāya asserting four modes of proof—from perception, inference, analogy, and verbal communication; the Vāishēshika admitting only the two first ones.

* Vid. 'Colebrooke's Miscell. Essays,' Vol. i. p. 261.

The name of logic, usually applied to the Nyāya, does not correctly define it. It does not treat of the theory of syllogisms and the notions connected with them, as its direct object, but only as a component part of its investigation. It rather aspires to the distinction of giving a complete system of philosophy, based upon the most elementary metaphysical notions, and the division dedicated to the explanation of syllogistical forms, is not even more explicitly treated than other parts of the system. To call the Nyāya logic, would be the same as to assign this name to the philosophy of Aristotle. There is no doubt, however, that the Nyāya has first among the philosophical systems of the Hindus examined the art of reasoning, and shaped it into its present form. This is generally acknowledged, and it has gained by this such ascendancy among the learned Hindus, that all of them refer to it as to their standard in logic, and however they may deviate from other doctrines of the Nyāya, they deem its study necessary for the purpose of giving a firm basis to their reasoning.

It is indeed one of the principal merits of the Nyāya, that its progress is marked by an admirably exact division of the topics, discussed in it, and in this respect it is not only superior to all other systems of the Hindus, but even modern philosophy might, with advantage, study it on account of its clearness and exactness. Though none of its investigations have been carried on to a satisfactory end, the Nyāya has, with the means at its command, fully described the circle within which it moved. We must at the same time bear in mind, that notwithstanding its exactness, there is one inherent fault in its exposition, viz. the neglect of all analytical method, a fault of all systems of the Hindus, which has perhaps, more than any thing else, contributed to the narrow limits of their mental horizon. This fault, however, it shares with many other expositions of philosophy; for instance, to mention a celebrated name, with Spinoza's system. It is a fault rather of exposition than of the system itself. No synthesis (in science) is possible without analysis, and having well understood the leading notions of a system, we can easily trace the analytical way by which they were obtained. This absence of analysis in the construction of the philosophical systems of the Hindus is the reason why so many enquirers have done injustice to their philosophical talent. For want of a clear analysis, unable to understand the aphorisms of the Hindu schools, composed in a language as well in

form as in thought, foreign to them, they thought the philosophical productions of many centuries and of an ingenious people, a web of either abstruse or puerile notions. On a closer examination we shall come to a juster opinion of them, and although we find a limit as well in the range as the depth of their enquiries, we shall come to place them among the nations which advanced the intellectual progress of mankind.

That Hindu philosophy will, however, have any influence upon the development of European philosophy and mediately of European civilization, must be denied. Why should this be the case? Although we must admit, that the philosophical results of the Hindus are as worthy of attention as those of the Greeks, still it is at the first glance evident, that the works of the Hindus are unfit to be transferred to another soil, while those of the Greeks will have always the same influence upon every rising generation in every clime and age. This difference, however, lies not so much in the development of the system as in the form. You are compelled to think by reading the works of the Greeks, they introduce you into the process of their thoughts, and by this, force you to accompany them with your own thoughts, until you arrive as it were by your own mind at the principles of their systems, from which point it is easy either to look back upon the way you have made or to advance further. The Hindus, on the other hand, are dogmatical; it is impossible for any one to understand their writings who has not previously, to a considerable degree, been practised in philosophical enquiries. Thus the want of interest felt in the study of their writings, is the punishment of mystery and exclusion. The same doctrines which might have been instrumental in enlightening thousands, are now forgotten, or in the possession of a few who are hardly able to comprehend them.

Among the general metaphysical notions, the notion of substance is the most important one, as upon it all other notions are either founded or are closely connected with it, and whatever may be the solution of all other metaphysical problems, they must be influenced by the notion of substance.

Substances are, according to the Nyāya, the substrata of qualities and actions, a definition, which is the right one, as *the basis of further investigation*—it is the right one, because founded on experience. Substance, we add, is in so far the substratum of qualities and actions, as the existence of qualities and actions depends upon the existence of sub-

stance; if quality were independent of another, it could not represent another, whose quality it is. The existence of substance must therefore be absolute, that is to say, not dependent upon the existence of another; for in this case, it would not be comprehended by the notion of substance, but by that of quality. And consequently, to think the idea of substance by any notions including dependance, is a contradiction. This contradiction (of comprehending substance under the notion of quality, and therefore) was committed by the Nyāya by its distinction between eternal and non-eternal substances, because the existence of the latter is not independent. In the notion of eternal substance, however, the true notion of substance is included, which is to be independent of time and cause.

Another question is, how a substance is united with its qualities? That a substance should have qualities, appears a matter of course, and to question it, shows a vast progress in metaphysical thinking. Although the Nyāya entered not expressly into the discussion of this subject, it must have felt its weight, as they found it necessary to invent a contrivance for such a connexion. A substance is, according to them, united with its qualities by a relation, called intimate union, which is something real, and is neither in substances, nor qualities, nor actions. We do not intend here to analyze this notion any further (stating, however, that the difficulty is not really removed by it,) but we turn to a third point in the notion of substance. Substance, according to the Nyāya, is not only united with its qualities by the relation, just mentioned, but all substances are united with the general notion of substance, and single substances in the same way with the notion of their own class. This general notion rather is a common property; for it does exist, independent of the mind, in the substances (also in qualities and actions) themselves, and is even eternal in eternal substances, not eternal in transient substances. This notion exactly corresponds with that of the so-called realists among the scholastic philosophers, who maintained the reality of general notions. Duns Scotus, for instance, asserted, that general properties (notions) were not only in objects *potentia*, but *acta*, and that generality was not only formed by the understanding, but that it existed previously to the mental conception *per se* as a reality, viz., The quiddity itself, which was indifferent to general or individual existence. A cause, however, was required to remove this indifference,

viz. Another more extensive quiddity, closely united with the first, and with the principle of individuity (afterwards called haecceity).^{*} Substances, as before said, according to the Nyāya, are either eternal or non-eternal. Eternal are space, time, ether, soul, and the atoms of mind, earth, water, fire, and air. Non-eternal are all compounds, or the things which we actually perceive, and which must have a cause of their existence. Thus substances are divided into those which are without cause, and those which have a cause.

There are three causes;—1. The cause of aggregation, or material cause, as yarn is the material cause of cloth;—2. The proximate cause, or the actual union of the parts which are to form a compound;—and 3. The instrumental cause, viz. the cause by which this union is effected.

This is similar to the doctrine of Aristotle, who admitted four causes; a material cause, a moving cause, a formal cause, and an end cause. The instrumental cause includes Aristotle's formal, moving, and end causes.

The notion of causality is certainly well considered, and infinitely superior to the notions which other Indian systems formed of it; for there are already made some steps in advance towards the proper discussion of this notion, if a difference in causes is acknowledged. In the enumeration of causes—the cause of motion appears to have been omitted: it is, however, contained in the notion of instrumental causality. All activity according to the Nyāya is limited to movement, acts of the mind being considered by them as qualities, and as all actions abide in substances, we must consider every substance as a cause of motion. They did not, however discuss, whether motion was necessary to all substances, or only to some or to one, that is to say, whether there is a *primum mobile* or not; they did not discuss the question whether different motions do not require different causes; nor did they lastly enter into an explanation of the notion itself.† They appear in fact not to have been aware of the intrinsic difficulties of the idea of causality,

^{*} Vid. Tennemann's Geschichte der Philosophie. Kerte Aufl. p. 256.

† The contradictions which Zeno found in the notion of movement, are well known, and without fully acknowledging their weight, it is impossible to obtain a correct notion of it. Aristotle was well aware of this, and endeavoured to remove Zeno's objections to this notion. How important, however, it is, correctly to define this notion, is evident even from the influence, which it exercised on the Nyāya, where motion is considered as an *act*, and even as the only act.

which undoubtedly is one of the most difficult metaphysical notions.* The contradictions in the notion of cause and effect appear with especial force to apply to such causes, by which a change in the qualities of a substance is effected, as chemical, animal, and psychical effects. Such effects are, however, denied by the Nyāya. Material causes must be understood as only the substrata, or the materials for a new union, as for instance, the two halves from which a pot is produced, are the material cause of the pot. There are therefore no real changes, but only changes of the accidental form, which substances may assume in their connexion with others; and there should not be changes at all we add. Every compound substance, according to the Nyāya, is ultimately produced from simple substances. Simple substances, however, are eternal, and all their qualities are also eternal. If this is the case, there is also no change of qualities in any compound substance, because by any connexion between them, different from an accidental relation, they would assume changes, contradictory to the notion, under which they are conceived. As the Nyāya, however, admits an actual change in compound substances, in which qualities, not to be met with in the simple substances, are produced, and moreover admits a compound, in which there is a comparatively firm connexion of the parts with each other, it has deviated from its notion of causality, and is hence guilty of the contradiction which it first endeavoured to escape. Notwithstanding these deficiencies of the Nyāya, we still maintain, that it approached nearer than any other Hindu system, to the true notion of causality, causality being, according to Pantheistic, not less than to sceptical idea, a product of habit in the association of our ideas.

In passing from the general metaphysical (ontological) to more special investigations (comprehending natural philosophy and psychology) we may first observe, that the same clearness obtains in the latter as in the former. Existence, or rather to use the Greek term *το ὄν*,

* Vide Sext. Emp. Adv. mathem. in Ritter's History of Philos. Vol. iv. p. 339. That cause could not be later than effect, is evident; but also the effect cannot be later than the cause; for if so, the cause, being antecedent to the effect, would be without effect, and a cause without effect, is a contradiction. And if the effect would be consequent to the cause, it would be, when the cause is no more, therefore an effect without cause. Both therefore must be necessarily together. If this be conceded, then there is the difficulty, why the one more than the other is producing (or cause). These are only part of the difficulties, and without solving them, the objections made against causality, are quite just.

in its connexion with material and immaterial phenomena, is much more distinctly conceived than in other systems of the Hindus. We find indeed the same material elements as in other systems ; viz., earth, water, light, air, and ether with the same qualities ; but while in all others they are only generally described, here there is made an attempt to explain the special phenomena as well as the sources of our perception of them, or in one word, we find here the basis of observation, and of the first lineaments of the consequent reflection upon the results of that observation. We meet here also the first remarks about space and time, and even some correct notions about their nature, and although both of them are placed among the substances, we must not forget the intrinsic difficulties of this subject ; which in our times only has been more satisfactorily investigated by Kant, Fichte, and Herbart. The error of considering space and time as substances, is a consequence of the notion the Nyāya had formed of substance, viz. as the substrate of qualities and actions. This idea would, indeed, have been correct, had the notion of existence been preserved. The Védānta certainly had a much more exact idea of existence, maintaining, that what exists (το ὄντως ὄν) must be simply existent, without any attribute whatever, and should strictly not be even considered by a plurality of notions. The Védānta, however, by denying the reality of phenomena, had nothing to explain, while the Nyāya, retaining the crude notions, given by observation, had no principles whereby to explain them. The most interesting point in this part of the system is the investigation into the nature of matter, an investigation which was indeed entered into by other Hindu systems, although not with the same success. The Védānta for instance, reduced the objects of the senses, or the things, composed of the gross elements, to elements, which are finer and imperceptible to the senses, undoubtedly for the same reasons as the Nyāya, viz. because the origin, the changes, and the destruction of the material things compelled the mind to fix the notion of existence upon some other natures, not affected by those conditions. But according to the Védānta, the simpler elements are only simple, because they are unmixed with others. As regards, however, space, no reduction was made, and their view on this point is very like the doctrine of Anaxagoras, who also started from an original homogeneity of the elements. The Védānta indeed did not confine its thoughts to those elements, but

proceeded to the supposition of a substance, in which there is no difference whatever, but for what reason this supposition was here made, it would be difficult to give a satisfactory reply, and as regards the principal point, space filled out by matter, it was not even touched upon. The Nyāya, on the other hand, has examined matter under this point of view, and arrived at the theory of atoms, in the same way as Leucipp and Democrit. It proceeded even further than either. With Leucipp and Democrit atoms have some, though imperceptible, extent, and also different figures and motions, while the Nyāya held them to be absolute units of space without any dimensions and motions, that is, mathematical points as regards space. They are eternal and unchangeable, and while they are without cause themselves, they are the causes of the material universe. They are imperceptible to the senses, and their knowledge is obtained by inference.

The same clearness and to a certain degree comprehensiveness is met with in their psychological enquiries. The faculties of the soul and its relations to the material things, and other objects of knowledge, are methodically described. The Nyāya draws a marked line between matter and spirit, by distinctly stating the notions, under which either is perceived.

The soul has, according to the Nyāya, qualities, opposite to the qualities of the substances, perceived by the senses, and is therefore distinct from these substances, that is to say, as regards special qualities; for as to qualities, ascribed to substances, as far as they are substances, both must of course agree. Qualities of the soul are the emotions and desires, volition and aversion, etc., and knowledge. Knowledge is produced by intellect, which is one of the (faculties) qualities of the soul. Intellect is again fourfold, it is perception, inference, analogy and verbal knowledge. Perception is the source from which all other knowledge flows, or rather, without objects of perception the other faculties of intellect have no materials to work upon. All knowledge, that is perceived, is perceived through a medium, through an instrument, by which the soul is in communion either with objects from without or from within itself. External objects are perceived through five external senses, these being in contact with the mind, while internal objects, and by them the soul, are directly perceived through the mind. The doctrine of the communication of the soul with external objects is very curious

and interesting, not only because it is original, but because it shows a remarkable acuteness in overcoming difficulties, met with in every system, which considers substances not only as individual beings, but also as a common essence that exists, although dependent upon the individual substances. To perceive individual external substances, and their properties in common with others, it is necessary that the intercourse of the senses with the external objects should take place accordingly, that is to say, that individual substances should be perceived by the connexion of the senses with these individual substances, and the common properties by the connexion of the senses with these common properties. Substances are then perceived by the soul as in their different relations, viz. first, as in relation of this individual substance and this individual quality, of this individual substance and this individual act, further, as in the relation, which this individual substance has with its class (general essence) or with its generality; and lastly, as in the relation, which this individual quality or this individual act of this individual substance has with its class or generality.

This, however is not sufficient; for a full comprehension, there are required also *general notions*, corresponding with those relations. A tree for instance would not be perceived, without the general notion of a tree, by which a tree at any place and at any time is perceived. This general notion requires again a kind of special knowledge, by which the general notion of a tree is referred to a certain tree. This kind of knowledge, though corresponding with the relations of all substances, which have both general and special properties, and though it is (implicitly) contained in every object of perception, still differs from the general properties of the things. It is a conception of the soul, produced by its own activity. This knowledge then is internal perception, that is to say, it is not produced by inference, or analogy, or verbal communication, but it is immediate and complete, as all knowledge by perception. Every perception then, according to this exposition, is based upon two elements, an external and an internal, or as these expressions do not exactly represent their notions, an immediate and mediate, an objective and ideal knowledge. In the same way are the objects of the soul perceived, viz. its different qualities, as aversion, volition, &c. are called. Though the soul is the object of the mind, it is not directly perceived by it, but it is inferred from its qualities. It is not necessary here to explain the other faculties

of intellect, viz. inference, comparison, and verbal communication, as they are discussed in another part of this paper. We here only add, that they must be considered as parts of the quality of knowledge, or, as we would express it, as modified operations of one and the same mental activity.

The mind, by which all knowledge is perceived, is not a quality or faculty of the soul itself, but it is an independent substance, atomistic in its nature. Hence only a single perception or idea is at one time perceived by the soul.

The soul itself is eternal, and therefore so also are its qualities, we should say, also its knowledge, although this knowledge be not perceived by the soul itself. It is at the same time every where, not, however, as an infinite soul, as the universal soul of the Védānta, where all things constitute the pervading soul, be it even a piece of matter, though bound by ignorance to a state of apparent material existence, but according to the Nyāya there are *infinite units* of soul every where present, through all the worlds of material creation. There is a general soul, and there are individual souls. The general soul has the same qualities with the individual souls, with the exception of aversion, pleasure, pain, merit and demerit, because these qualities would involve imperfections. The individual soul is subject to the law of transmigration, and happiness and misery are the consequences of its good or bad actions. It is, however, possible for the individual soul to emerge from the vicissitudes of worldly existence by the attainment of true knowledge.

It would be superfluous to point out the marked distinction, drawn here, between body and soul. Though a higher development of philosophy may destroy the distinctions between soul and matter, that is, may recognise matter, or what is perceived as matter, as the same with the soul (as for instance Leibnitz did), it is nevertheless certain, that no true knowledge of the soul is possible, without first drawing a most decided line of demarcation between the phenomena of matter and of the soul. In the Nyāya there is even an approximation to the doctrine, that soul and matter are as to their principles one and the same, viz. in the theory of atoms, according to which atoms are the negation of space. From this notion we may draw the inference, which has not been drawn by the Nyāya, it is true, but which would have been only a necessary consequence from the premises, that matter, being a compound of atoms, is only a phenomenon, as regards its extension through space. Where then

is here shown the difference between the soul and the true substratum of matter? Let us see then, what is the soul? The soul is different from matter, as this last is perceived by the senses as extended through space. This distinction is true, but further to conclude, that the soul is also different from matter in its real nature, where matter is not extended, is certainly hasty, and does not follow from the premises. What then is the soul according to them? It is all-pervading, infinite, like ether, space and time. This answer, though far from satisfactory, shows, that they felt the difficulty in determining the notion of the soul, when their other notions had undergone a decided alteration. The most peculiar notion in their psychological theory is the existence of the mind independent of the soul, although most intimately connected with it; for through the mind only the soul perceives, as well its own qualities, as the qualities of external substances. How could the Nyāya have made a supposition in which the contradiction is so evident? For it is easy to conclude, that if the mind is independent, its perception is also independent. If the mind perceives, this perception is not in the soul, and if this perception is in the soul, it is not perceived. The soul then has knowledge, which is not real knowledge, because not perceived, and the mind has no knowledge, though it perceives.

We may solve this difficulty at least in some way. The mind was first undoubtedly considered as an internal sense according to the analogy of external senses, in order that there be a unity of perception, and also that, as the external objects are perceived through different media, so the objects of the soul be perceived through an analogous internal medium, a supposition, which has also been made in modern (English) philosophy. So far the Nyāya might have also considered the mind as an internal sense, but they met with a difficulty, which was not felt in the same intensity by modern philosophers. If the knowledge be perceived by the soul through the medium of the mind (the internal sense), why is knowledge not always present in the mind? why does it disappear and give place to other objects of perception? Locke was surprised at the narrowness of the human mind, without being able to account for it; the Nyāya in endeavouring to account for it, invented an independent substance, the mind, which is an atom, and according to its atomistic nature is only able to represent or to perceive one object at one and the same time.

This, I think, is the solution of the difficulty, and though it is certainly only an evasion, because its supposition creates greater difficulties than the former one, it still gives evidence of a spirit of enquiry in the school.

In comparing the psychological theory of the Nyāya with more modern doctrines (with the exception of the latest period) we must admit, that in a metaphysical point of view there is no great difference between them. The same objections are to be made to either. The doctrine of faculties being involved in the same contradictions as that of qualities. In either case, if you are to explain, what the soul is, you have to state, what it is, independent of its qualities or faculties, and also to enumerate the latter. Your explanation will thus point out a quale, which is not a unity, but something defined by a variety of notions. This, however, is not the place to discuss the matter and we wished only to show, that modern philosophy in this respect cannot boast to have advanced one single step beyond that of the Hindus, that is to say, in the metaphysic of the soul, although it would be absurd to deny, that modern psychology, as to the observation of psychical phenomena, has made rapid strides, towards perfection.

In passing over to the strictly logical enquiries of the Nyāya, we have to premise, that we cannot view them with the same satisfaction, and although we make ample allowance for the different forms of language, in which they were explained, we are compelled to confess, that they are neither exact nor complete.

The Nyāya has treated the logical topics in the inverse order of that adopted by us, viz. first inference, then ideas, and lastly propositions. This order is followed, not in consequence of a different method of arrangement, but in consequence of the subjects being based upon different grounds, and flowing from different sources. Logic might undoubtedly be treated analytically and commence with the exposition of syllogistical forms. Considering argument as a fact, we might analyse various arguments, and proceeding to their elements, that is to propositions, gradually arrive at ideas or notions. But the Nyāya, far from following such an analytical course, holds inference to be a quality, different from the quality of forming names and notions, and discusses inference before verbal knowledge, evidently with the purpose of showing, that the latter in some way depends upon the former.

We, however, treat these doctrines in their common order, with no other intention than to make ourselves better understood.

Verbal knowledge is one of the divisions of intellect. The first act or the first condition of understanding words, is the forming of the name! A name is corresponding to a certain object, and this object is connected with the name by the power of the name. A name which has such a power, is a word. The clear and distinct knowledge of what is implied in a word, is produced by a third act, and is the meaning of a word. This latter is in fact identical with idea or notion, as is evident from the examples given, as for instance, a tree is a thing which has root, stem, branches, leaves, etc.

Here again is the order perverted, the name is certainly not, the first operation, and the object to be named, the second, but just the reverse. There must be objects to be named, and though we may admit, that the clear idea of a subject often succeeds a name, still the object, of which the notion is formed, is the first, and we must assert, that what precedes the notion, also precedes the name.

The enquiry, how ideas are formed from a variety of like objects, belongs to psychology, and however interesting this question otherwise may be, logic has nothing to do with the psychical process, by which ideas are produced. If this were the case, we might still have to wait for a logic, as a psychological theory has not yet been established to general satisfaction, while logic as a science has been completed for more than two thousand years. By considering the names and afterwards the corresponding notions, the real character of a notion has been at least obscured. From the given examples we see, that a notion, instead of being defined by the genus, under which it is contained, and the specific difference, is explained by a genus, which is distant from it by a number of intervening notions (for instance, genus of tree=thing) and by a specific difference, which besides its own difference, enumerates properties which it partakes with others (for instance root, stem, leaves, etc.=specific difference.)

The meaning of a word or idea, ought to have been considered in its connexion with other ideas, as made up by genus and *differentia specifica*, the co-ordination and subordination of ideas, as their compatible, contrary, and contradictory opposition. Here, however, are genus and species raised to categories under the names of generality and particularity,

being there the common properties of substances, qualities, and acts while the opposition of ideas is treated in the seventh category, viz. that of negation. There are notions, which, according to our view, in contrary opposition, placed under the head of absolute negation and notions, according to us in contradictory opposition, in mutual negation.

From this arrangement then did not only result an imperfect exposition of the logical relations among ideas, but an important metaphysical error, by which logical relations of ideas are considered as real properties of substances.

In finding the logical treatment of notions by no means satisfactory, we may at the same time observe, that there are many valuable remarks about some psychological and grammatical relations of ideas which we do not recollect to have found elsewhere. These we have given in a note to the text, where this subject is explained.

A proposition to convey a distinct meaning, must, according to the Nyāya, have four qualities :

1. Contiguity, which, according to some, is the uninterrupted succession of the words pronounced in a sentence, so that for instance, the first word of it be not pronounced in the present moment, and the next half an hour afterwards, according to others, the arrangement of the words according to their grammatical connexion, for instance, that a preposition be placed together with the word which depends upon it, and not with a word, to which it does not refer.

2. Consistency, or the mutual agreement of the words, according to their sense, so that contradictory terms be not connected.

3. Structure, or the grammatical (terminations) forms of the words, which correspond in their meanings (for instance, that the verb agrees with the subject in number and person.)

4. Intention, that is, the meaning which the speaker wishes to convey by a sentence.

There again the logical characteristics of a proposition have been omitted, as all those points, with the exception perhaps of consistency, belong to the grammatical structure of a sentence.

The logical explanation of propositions, as a matter of course, passes over any grammatical form a proposition may assume; it treats only

of the relation between two ideas, and its simple question is, whether two ideas can be connected or not.

It is evident, that in this way neither quantity, nor modality of propositions could have been discovered. We might, however, dispense with them, as these forms are not strictly logical; but not even the division of propositions according to their quality has been made by the Nyáya.

The theory of ideas and propositions is the weakest point in the logic of the Nyáya; they are more successful in explaining the form of arguments; for though the theory of syllogism is far from exact and complete, we must admit, that they understood the general character of a syllogism.

Góutama, the founder of the Nyáya, thought, that a complete syllogism ought to contain five members (propositions); viz. 1, the proposition, (that is, what is to be proved by the argument;) 2, the reason or argument; 3, the instance; 4, the application; 5, the conclusion, for example—

This hill is fiery

For it smokes.

As for instance a hearth.

This hill smokes

Therefore it is fiery.

We need not expatiate on the five members, although it may indeed create some surprise, that philosophers, who gave an analysis of syllogism, should not have immediately observed the superfluity of two of these members; in more modern times the syllogism was reduced to four members (by others to three), of which we now give a description.

The first act is the statement of a fact (or proposition minor). For instance: this hill smokes. With the idea of smoke is associated the idea of fire, as we know from a former observation, that smoke is connected with fire, as for instance, fire on a hearth. Smoke is therefore the argument, and has the predicate, that fire is to be inferred from it under similar circumstances, as those which were observed concerning the fire on a hearth. The second step therefore is, that the argument (smoke) recalls its connection in a former time with another idea. This second act is called consideration, or to give it in a sentence,

Where there is smoke, there is fire, as for instance, on a hearth.

The third step is, that such a smoke from which fire is inferrible, is on the hill : and the fourth step, the actual connexion of the fire with the hill, that is, the hill is fiery.

The error in this exposition is the confounding logical correctness with truth. The Nyāya perceived very well, that the terminus medius by its being separately connected with two other ideas or denied of one, connected or separated these two ideas,—which is the real operation in arguing ; but at the same time they wanted to guard against false premises or a false conclusion, and for this purpose they required a consideration, which was to establish the truth of the preposition major by a reference to an instance, in which the truth of this premise was exemplified. Their investigation was therefore not only directed to the logical operation of arguing, but also to the truth, which may result from it, and both the truth of the conclusion, and the correctness of the argument, should be the result of one and the same operation, which of course is impossible. We would not so much object to this process on the ground, that it is tedious, and useless, as regards the syllogism itself (for it may be good to draw the attention of the beginner not only to the special connexion of the ideas in the syllogistical form, but also to the truth of the premises) but on the ground, that it is considered only valid by giving an instance. Hence arguing is not allowed, where no instance can be given, by which not only an undue restriction takes place, but also, in some cases at least, four ideas are introduced.

Another error is, that by inference not only a new *connexion* of ideas is to be given, but also a new association of an object, which is perceived, with something, that is not perceived, as for instance smoke, which is perceived, with fire, which is not perceived. Here then, it appears, is inference limited to objects, at present in our perception. Though this is denied in the later expositions of the Nyāya, and is expressly stated as an error of the earlier philosophers of the school, still *perception* is not omitted as a necessary condition of inference, which must of course confine syllogisms to a much narrower circle than is according to their nature.

The third error, which has a close communion with the first, is the confounding of the logical relation between argument and conclusion, with the relation between cause and effect. All the examples given to illustrate syllogisms, do not represent a connexion between ideas, in

which the relations are those of notions, that is to say, either excluded from each other, or contained in a higher one, but in the relation of cause and effect, and vice versâ, which may certainly be expressed in a syllogism, but only in one kind of syllogism, viz. in a conditional one. That this error is not owing to the examples, but to the doctrine itself, is proved by Goûtama's division of syllogisms, which are either passing from the cause to its effect, or consequent, passing from the effect to its cause, or from general notions. An inference of the first kind is, when rain is inferred from a collection of clouds, of the second, from the increase of water in a river to rain, of the third, from the notion of earth to the notion of a substance. This latter would indeed answer a relation in the notions themselves, but it is of minor importance, and it has been even omitted in later treatises.

If even the nature of a syllogism be not expressed in its precise logical form by the Nyāya, we much less can expect to find here a complete enumeration of the various kinds of syllogisms. Goûtama's division of syllogisms has been just adverted to, and it is hardly necessary to remark, that this division is not logical. In later treatises of the Nyāya syllogisms are divided into positive and negative ones, and from the examples given in illustration it appears, that the two first syllogistical forms are represented by them; here, however, is their theory finished, and we find no trace of the different moods the syllogistical forms can enter into.

It is a remarkable circumstance, that the general form of a syllogism should have been found by the Hindus, and yet that they still should not have discovered the different forms and moods, the diversities of which are the result of a mere combination. This is the more remarkable, as in their philosophical arguing we almost invariably find a syllogism expressed in an enthymematical form, where the conclusion and the terminus medius are given, by which the force of an argument is not only forthwith apparent, but even a certain elegance produced, and this even without referring to an instance. We think, that this deficiency was the consequence of two causes especially—first, they were unable to disengage themselves from the grammatical forms in which human ideas are expressed, as shown by their technical logical language, which though as precise as possible, is not clear but cumbrous and not comprehensive, and secondly, from their pious regard for every thing tradi-

tional, be it in political institutions, in religion, or in science. The Sūtras, in which their ancient systems are expressed, have always remained text-books, and any discovery that had been made in theory, did not prompt them to attempt a new exposition of science, but gave only occasion to a new interpretation of the ancient doctrines of the school.

A comparison between the logic of Aristotle and that of the Hindus would be neither interesting nor instructive, and we therefore beg to decline it. With the Hindus, logic is a first attempt, marked with the vestiges of rude workmanship and conception, while with Aristotle it springs forth perfect at once.

The Bhāsha Parichéda itself is considered as a text-book in the Brahminical schools. There is no Pundit of any repute who does not know it well, and many know the whole work by-heart. And indeed it is admirably adapted for the purpose of introduction into the study of the Nyāya and Vaishéshika philosophies. It is a succinct exposition of the principal topics of the whole system, and may easily be committed to memory. It is written in the well-known Anustabh Slókas. The style, however, is not poetical at all, but that of the most sober prose, and nowhere is the attempt made to combine the graces of imagination with philosophical method. The language is as simple as possible, and vastly different from the language of the commentary, which is extremely difficult to understand, not only because it expresses the simplest ideas in the most abstruse language, but also selects terms, which either belong to the Nyāya philosophy alone, or have a different sense in other systems. The difficulties a European first experiences in understanding a work of this school, are less in the subject than in the mode, in which it is treated, so remote from European ideas, and in fact it is only by tracing the connexion of all the ideas that any one will be able thoroughly to understand it. The commentary is certainly a valuable assistant to the understanding of the work, and I have made ample use of it for the interpretation of passages, which I generally did through the very words of the commentary.

The course followed in the work, is very simple. The author gives first the leading ideas of the system, that is, the highest metaphysical notions, which are gradually to be explained in his work. These are the notions of substance, quality, action, generality, (class) particularity, (species) intimate union and negation.

He then enumerates the various substances, qualities, actions, etc., after which he explains the properties, common to all categories, and then those, common to more or less of them. After this exposition the different substances in their relations to themselves and to other substances as well as to their qualities and actions are explained.

In the same way the author discusses the qualities of the substances, and his work is finished, when he has treated on the last quality, enumerated at the commencement of his treatise. The other categories are not especially inquired into, which indeed was not necessary, as they are dependent upon substances, qualities and actions, and their applications have been fully given, whenever the relations of the categories required it.

The first edition of the Sanscrit text of the *Bhāsha Parichēda* appeared in 1827, under the auspices of the Committee of Public Instruction. The Sanscrit text in Bengalee characters was sometime afterwards reprinted with the addition of a Bengalee translation of the text, as well as of the commentary, of this latter, however, with considerable alterations. On the merits of the Bengalee translation I am unable to express an opinion, as I saw this edition but once, and did afterwards not succeed in getting a copy of it. The translation, which I offer to the public, is made as literal as the idiom of the English language would admit, and although it was my endeavour strictly to adhere to the English idiom, I was sometimes forced slightly to deviate from it, in order to convey more precisely the meaning of the original.

In conclusion, I cannot omit gratefully to acknowledge the liberality of the Asiatic Society, which enabled me to add the Sanscrit original to the translation. This text is a mere reprint from the Calcutta edition, free, however, from the few errata found there. There is no manuscript of this work in the Library of the Asiatic Society with which I could have compared the Calcutta edition. I believe, however, that such a comparison would have been quite unnecessary, as an incorrectness of the text must disclose itself in a philosophical work like this by the want of connexion, and can therefore be easily rectified.

(To be continued.)

*Memoranda on Explosive Cotton, by W. B. O'SHAUGHNESSY, M. D.,
F. R. S., Co-Secretary, Asiatic Society of Bengal.*

Having been permitted to publish the results of some experiments which I have recently conducted by order of Government, with the object of testing the value of explosive cotton for *Military* purposes, I trust the details I proceed to submit may not be altogether devoid of interest.

Soon after the first accounts arrived from home regarding *Schoenbein's* discovery of the new explosive, a small portion of his preparation was received in Calcutta, of which from two sources I obtained altogether about a grain in weight. There was at the same time received from Professor Schoenbein a kind of paper, perfectly transparent and colourless, the preparation of which was believed to be in some manner connected with that of the explosive cotton.

Minute as was the quantity of the cotton I received, it was still sufficient to afford a clue to the nature of the preparation. A particle exploded over mercury in a glass tube, disappeared without residuum—and gave a transparent and colourless gas, but slightly soluble in water and giving red fumes by mixture with common air, and a whitish precipitate when agitated with lime water. The microscope further showed that the structure of the cotton was unaltered by the preparation it underwent. This was sufficient to prove that the explosive cotton contained nitrogen—and rendered it probable that it might be prepared by the action of nitric acid on the vegetable fibre. It recalled to mind too the experiments made by Pelouze in 1833, who found that paper immersed for a moment in the strongest nitric acid, then thoroughly washed with distilled water and dried, became exceedingly inflammable, being transformed into a substance which he named *Xyloidine*.

Working upon these data, I succeeded late in December, in preparing an explosive cotton, and about the same time my friend Mr. Siddons, by independent experiments, arrived at the same result.

That the explosive cotton we prepared is identical with Schoenbein's, seems to be proved by the following circumstances. 1. On microscopic examination there is no perceptible difference of structure. 2. On explosion they yield the same gaseous mixture—and *lastly*, by immersing the best kind of the Calcutta cotton, in pure sulphuric ether, it is

dissolved and the solution evaporated spontaneously on a flat surface, affords a transparent, colourless, glass-like paper, exactly the same in appearance and properties as that which accompanied the specimen of Schoenbein's cotton sent to Calcutta.

Reserving for a moment the description of the process followed by Mr. Siddons and myself, as soon as a sufficient supply was obtained for analytical experiments, I ascertained that the cotton which in its natural state is a compound of carbon, and the elements of *water*, had by immersion in a mixture of equal measures of strongest nitric and sulphuric acids, parted with its constituent water, and that in the place of this had been substituted one of the series of Nitrogen and Oxygen compounds. The use of the sulphuric acid is simply by its powerful affinity for water to withdraw this from the carbon of the cotton; no portion of this acid or its constituents enters into the composition of the new explosive compound. Ultimately the explosive cotton was found to be a compound of Nitrogen, Carbon, and Oxygen, isomeric with (or of being the same ingredients and proportions as) the old and well known *fulminic or cyanic acid*, the active principle of the fulminating silver, mercury, &c. But here as in many other isomeric compounds, numerous differences in properties became manifest, depending chiefly on the mechanical structure of the different forms of the preparation. I have not as yet completed to my own satisfaction a sufficient number of exact analyses to warrant my expressing the results in figures, but the numerous facts which I have observed, tend to the conclusion that all the isomeric varieties of cyanic acid are represented in the explosive cotton, passing into each other under the influence of slight and often inappreciable circumstances, the general event being the formation of a substance bearing a close resemblance to *Cyamelide* ($C. 2. O. 2 + N. II.$) being white, neutral, insoluble in water and acids, dissolved in aqua Potassii ammonia being set free, yielding sulphate of ammonia when heated with strong sulphuric acid while carbonic acid escapes. This description applies equally to *Cyamelide* and to the best explosive cotton. (See *Gregory's Organic Chemistry*, p. 295.)

Without entering upon elaborate chemical details unsuited to the object of this paper, it will suffice to say that we found the prepared cotton to be increased in weight by 20 per 100, insoluble in water, unchang

ed in composition or properties by immersion or even boiling in salt water, insoluble in alcohol, oils, acetic acid, ammonia, weak acid and alkaline solutions—such as solution of carbonate of soda or of potash or lime water. When very well prepared it is entirely soluble in anhydrous sulphuric ether, and the solution when evaporated yields the glass-like paper. If the ether contains alcohol or water the paper is opaque and porous, like ordinary filtering paper.

The cotton thus prepared may be exploded over gun powder without igniting it. It explodes by a violent blow on an anvil with the sharp ring of percussion powder, but the explosion only affects the particles immediately struck, and does not ignite the rest, but if gun powder be mixed with it the whole is fired.

It does not explode by the electric spark, or by the discharge of a single Leyden jar.

It explodes on being heated to 375° of Fahrenheit.

It does not explode by friction between wooden or metallic surfaces till the temperature of these rises to 375° ; neither does it explode by compression in powerful screw presses. On the contrary, compression exercises some singular effects on its explosiveness and combustibility. The very most explosive kind twisted into a tight cord burns like quick match, and a tight ligature of wire or twine round a portion of this intercepts the ignition. In the same way when compressed into the touch-hole of a cannon it is fired with the utmost difficulty, so that it cannot be used for priming; accordingly in the ordnance trials at Dum-Dum the cotton charges have been always fired with quick match or powder priming.

Exploded in a loose heap its force appears to be exercised almost altogether in the lines of least resistance; thus on two occasions nearly two pounds weight while being dried on a water-bath exploded accidentally on a thin copper tray, which was not injured or displaced—and on both these occasions the plaster of the roof and the loose tiles of a shed within three feet of the cotton remained undisturbed. A man standing close to the tray was uninjured, and several test glasses ranged on a party wall within $4\frac{1}{2}$ feet of the explosion were not moved or broken or their contents spilled.

Regarding the results obtained by my first experiments, in connexion with the valuable properties ascribed by general rumour to the explo-

sive cotton, to be of sufficient importance to warrant more extensive trials, I reported them officially to Government, and was immediately directed to prepare a sufficiently large quantity of this cotton for a series of ordnance trials at Dum-Dum. With the valuable assistance of Mr. Frewen of the Mint Assay office, I have accordingly had manufactured over 100 pounds of the explosive cotton, and the experience thus gained regarding its preparation and properties enables me to state such facts as may enable others to form a more correct estimate of the degree of practical value of this preparation, for Military proposes, than can be obtained from experiments on the manufacture and properties of a few ounces of the explosive.

PREPARATION.

In the experiments carried on at the mint, 100 tola weight (3 and $\frac{1}{8}$ th troy pounds) of cotton was operated on at a time, the cotton having been previously cleaned and loosened out by the native bowstring apparatus.

The acid mixture consists of equal measures (in all 336 fluid ounces) of sulphuric acid, Sp. gr. 1843, and nitric acid, Sp. gr. 1460. The sulphuric acid weighs 840 tolas= \approx to 21 lbs av. and the nitric acid weighs tolas 651= \approx to 17 av. lbs. fractions omitted. The mixture when cool is placed in a large shallow porcelain basin, so situated as to permit the fumes to be carried off by a current of air. The cotton is introduced with iron tongs in small portions at a time, pressed under the surface of the acid for about two minutes and moved to the opposite side of the pan. This is continued till 50 tola weight is introduced. When the last portion has been immersed for about three minutes, the cotton should be lifted out, by the tongs, quickly transferred to a screw-press of iron or stone and the excess of acid pressed out. This is continued till the 50 tola weight is pressed. The cake is then rapidly removed to a large vessel of common water, torn asunder by hand, washed and squeezed and thrown into a second vessel of water; again washed and squeezed, and the masses thrown into a vessel containing a solution of 1 pound of carbonate of soda in 20 gallons of water. Well washed here the mass is placed in a large screw-press—the pressed cake again washed with water. It is now fit for drying, which is best done by solar heat on a dry terrace over tarpaulin or sheets of iron, taking the utmost caution to avoid the possibility of explosion by accidental sparks.

Two days' exposure are sufficient in the month of February, to bring the cotton into as dry state as is required for its use with ordnance or small arms.

Steam or hot water heat may be used for the drying with perfect safety with suitable apparatus. But unless this be in every respect properly constructed, the danger of making a large quantity of cotton is too serious to be trifled with. I have also dried cotton successfully *in vacuo*, and by the immediate contact of masses of quick-lime, but it is needless at present to occupy the pages of this Journal with descriptions of the arrangements, by which these facts can be practically applied.

When dry the cotton is next to be carded; or loosened out by the native bowstring apparatus.

The expressed acid may be used for the remaining 50 tolas of the 100. It will however be generally found that after 40 tolas have been immersed, the acid begins to corrode or pulp the cotton, producing a new series of compounds, chiefly oxalic acid, formic acid, and sugar.

The same series of operations above described is gone through with the second acid, and the resulting cotton kept apart.

After drying, it is found that the 100 tola weight of cotton has increased to 114 to 120, according to the care with which the process has been conducted.

The process thus performed affords two qualities of explosive cotton.

The first 50 tolas may be designated 1st or *best quality*.

The product of the 2d expressed acid and the second 50 tolas of cotton should be marked 3d or worst quality.

If these be mechanically mixed by carding or the bow-string, the mixture may be called 2d quality.

The acid mixture which after cooling was Sp. gr. 1667 before use, after once having been used is of Sp. gr. 1687. Twice used its density is 1691. The acid once used measures 180 fluid ounces and by distillation yields $\frac{1}{4}$ its bulk of nitric acid, Sp. gr. 1480; the acid twice used yields $\frac{1}{8}$ th its bulk of nitric acid, Sp. gr. 1400. By prolonged boiling in platinum or glass vessels, the pulpy cotton in the mixture is decomposed with copious effervescence of carbonic acid and nitric oxyde gases; when this terminates and the acid in the boiler begins to blacken, the concentration has proceeded far enough, and on cooling the original sulphuric

acid is recovered with little diminution either of strength or quantity.

The washings in the several tubs being neutralized with carbonate of soda, yield on boiling down, a large quantity of mixed sulphate and nitrate of soda, which may be used for the economical manufacture of nitric acid, so as materially to diminish the cost of the process.

Reserving an account of the cost of manufacture, I proceed now to show the properties and effects of each of the three varieties of the cotton above described.

Best Quality, No. 1.

Snow white, explodes without leaving the least residuum or dampness—does not fire powder if ignited over it. Flashed on the hand causes no pain; is almost entirely soluble in sulphuric ether. One pound weight avoirdupois can easily and safely be compressed into the space of 128 cubic inches* without diminishing its explosive power for ordnance or small arms.

Exposed to the air in a large room, protected from dust *this* quality of cotton (dried by solar heat for two days) fluctuates in weight according to the hygrometric state of the atmosphere—the maximum increase having been 1.34 per 100, as shown in the annexed Table of observations continued during 26 days.

At this maximum of absorption no diminution of projectile power was experienced in trials made with an eprouvette mandril gun, the invention of Colonel Forbes, especially suited to these experiments.† But when the quantity of moisture designedly added exceeded three per 100, the explosive power fell rapidly, but was regained altogether by redrying the cotton.

With this quality of cotton trials were made at Dum Dum on the 19th and 25th of January, and 24th of February, with the results shown in the accompanying Table.

* The bulk of 4 pounds of ordnance gunpowder.

† Of which I hope to be permitted to give a more minute account in a future number of the journal.

DUM DUM.

Ordnance Experiments with Gun Cotton.

January.	Quality.	Quantity.	Gun used.	Weight of Ball.	Windage.	Elevation	Ball thrown yards.	Remarks.
*		Ounces						
19th	3d	4	8 inch Mortar.	68 lbs.		45°	250	Mortar somewhat foul.
"	1st	2	"	"	"	"	331	Perfectly clean.
"	"	4	"	"	"	"	839	Quite clean. Recoil 2 inches.
"	"	6	"	"	"	"	1030	Do. Time 14 seconds. Recoil 8¼ inches.
"	"	8	"	"	"	"	1186	Do. Time 15½ seconds, recoil 10 inches.
"	"	10	"	"	"	"	1295	The same as last—Perfectly cool.
"	"	12	"	"	"	"	1366	The same time, 16½ seconds. Recoil 13 inches.
"	"	4	"	45	"	"	706	} Guns clean, and cool; recoil trifling.
"	"	8	"	"	"	"	1424	
"	"	4	6 pr. brass.	"	3°	"	745	
"	"	8	6 pr. do.	"	6°	"	1550	
"	"	12	9 pr. do.	"	6°	"	1672	
25th		4	8 inch mor.	45	"	45°	717	
		4	"	"	"	"	724	

The ranges above exhibited are as nearly as possible four times as great as those given in the Woolwich tables of mortar practice in 1838, strength of powder from 21 to $22\frac{7}{10}$ lbs. With this powder an 8 inch mortar with 46 pound shot gave with $15\frac{1}{2}$ ounces a range of 700 yards which was in all the above trials exceeded by 4 ounces of cotton.

In two trials made of some cotton prepared by Mr. Siddons, corresponding ranges were obtained with the 8 inch mortar and 6 pr. field gun.

Lastly a sample of cotton sent to me for trial by Mr. Scott of the H. Co.'s Dispensary tested by the mandril eprouvette gun gave a range of $110\frac{1}{2}$ feet against 111 of my first quality.

These experiments with cotton made with the utmost care by three different persons, show an extraordinary uniformity in the quality and

* Present on the 19th January—Lieut.-Col. Lawrenson, C. B., Capts. Whiteford, Broome, Douglas, and other officers of the Artillery Regiment.

power of the best article—and show that this quality is obtainable despite of difference of manipulation in the process, and that it is dependent on the definite chemical composition of the compound itself. The fact is one which affords the most encouraging prospects to those interested in developing the qualities of the article.

The trials made with this variety of the cotton with small arms have been very numerous and satisfactory. The ratio of superior power to that of powder, is evidently much greater than in the cannon and mortar practice, but as the experiments are not capable of being expressed in figures, I will not dwell on them in more detail.

In all the ordnance experiments above narrated there were remarked—

1.—Entire absence of smoke.

2.—As far as could be judged very trivial heating of the guns.

3.—Entire absence of dirt or wetting.

The report, recoil and time of flight of the shot and shells seemed equal, as closely as could be estimated, to these effects from the charges of powder required for equal ranges.

It should further be observed that of this quality of cotton from 6 to 7 ounces on two trials burst an 8 inch 46 lb. shell, but it should be stated that it was with considerable difficulty this quantity of cotton was forced into the shell.

2d and 3d quality of Cotton.

The 2d is prepared as above described, by mixing together the whole of the 100 tola weight manufactured from the quantity of acids above specified. No. 3 or worst, is the product of the last 50 tolas of cotton and expressed acid.

It was with the 2d quality my first experiments were made; 4 ounces tried at the Eshapore powder works by Major Anderson and myself gave, with a 68 pound shot, a range of 461 yards, thus:—

Best quality, 4 oz. 68lb. shot, range 839 yards, tried at Dum Dum.

2d quality, ditto ditto. 461 Eshapore.

3d quality, *worst*. 250 Dum Dum.

H. C.'s powder, best ordnance quality 189 Eshapore.

The effect of the *mixture* or quality No. 2 it will be observed is inferior to the arithmetical mean of the two forces, the range being 461 instead of 544 yards; but this variation may have proceeded from

the mixture on trial having been made with cotton of two different days' manufacture.

The preceding experiments show that the worst cotton is superior to the best ordnance powder in the proportion of 250 to 189 in the trials under description, and that the 2d quality is superior to powder in the proportion of $2\frac{1}{2}$ to 1. But other considerations arise regarding these inferior qualities which we have found to have faults which more than outweigh the value of the superiority of range.

The inferior kind of cotton is of yellowish colour, insoluble in ether—so hygrometric that it absorbs from 5 to 10 per 100 of moisture from the air in 24 hours. It soils and wets the guns and leaves in them a body of wavering flame and large quantities of half ignited cotton, a source of the most formidable danger to the gunners, and likely to lead to explosion of ammunition in the vicinity. It is rendered useless by being compressed or even tied in a cartridge bag. In several instances while the loose cotton of this quality gave a very respectable range, an equal quantity tied up in a cartridge bag, scarcely expelled the ball from the gun.

But the most fatal objection to the use of this inferior sort is, that stored even in hermetically sealed ammunition chests, lined with copper and without the contact of the air, it changes composition, and in less than six weeks becomes totally inert. Thus a box proved at Dum Dum on the 19th January, of which 4 oz. threw a 68lb shot 250 yards from an 8 inch mortar, was re-opened on the 27th of February, and the same quantity barely threw a 46lb shot a few feet from the mouth of the mortar.

The cause of this change is the same as that which affects so many cyanogen compounds, especially the hydrocyanic acid. The cotton under description was most carefully prepared, and every trace of acid left by the process well neutralized and washed out. Still in six weeks it had changed its composition and become entirely useless, and when the chest was opened there was perceptible a strong smell of nitric oxide gas. This fact is sufficient to show that *it is only the very best kind of cotton which can be depended on for any military use*. It next remains to be considered whether to this kind also there may not exist such objections as may counterbalance the very great ad-

vantages which in point of range, cleanliness, lightness and absence of smoke, I have shown it to possess over ordinary service powder.

It has been stated that the low temperature at which this cotton explodes would render rapid firing impracticable in consequence of the heating of the guns. Now the true exploding point is 375° Fahrenheit. Under this, whatever may be asserted to the contrary, the best cotton cannot be made to explode. Now whether it arise from the greater quickness of the explosion, or the inferior degree of specific heat in the material, the fact is certain that it would take a greater number of rounds of the best cotton than ever could be fired in the sharpest action to bring the temperature of the gun so as to approach the exploding point.

In one set of experiments instituted on this question, 80 rounds of cotton were fired from a gun metal cone of exactly the weight of the whole of the cotton used. The interval was but ten seconds between each round. When the last round was fired, a piece of the best cotton was firmly pressed against the sides of the metal cone in every direction without ignition taking place. On repeating the experiment and taking the temperature of the cone it was found to be below that of boiling water!

The next objection made is the assumed probability of *spontaneous combustion*. Now the combustible material in this compound being already combined with all the oxygen it requires, I can see no reasonable cause for the apprehension of the spontaneous heating, which in raw cotton arises from the absorption of the additional oxygen with which its carbon and accidental oily matters have a tendency to unite.

This process I have most carefully studied with reference to an attempt made some years since to fire the arsenal in Fort William, on which occasion a Court of Enquiry, of which I was a member, had satisfactory proof before them that spontaneous combustion was not concerned in what took place. The experiments then carried on led to our being enabled to produce this kind of combustion with perfect certainty in masses of tow, cotton, cloth, &c. duly prepared for the purpose. Such experiments I have repeated with the gun cotton, but I have never detected the least trace of heating. The objection nevertheless is one which time alone can dispose of effectually.

As to danger in the process of preparation, I do not deny that there is some risk. But this, I know by sufficient experience, is infinitely

less than that is attendant on the manufacture of gun powder. In the preparation of gun cotton there are but two periods of risk—the first is while pressing the cake still full of acid. On one occasion this caused an explosion, but of too trivial a nature to be worth description, and moreover the accident is one which cannot cause injury with a press properly constructed.

The last stage of drying unquestionably demands every precaution. In my late experiments, a stray spark ignited at once ten pounds of cotton which scorched more or less severely two men who, contrary to orders, were quietly seated in the middle of the mass. Had this happened with the same proportionate quantity (40lbs.) of powder, there can be no doubt what would have been the result to the lives of the men, and to the premises where the accident occurred.

I repeat that during the other stages of the manufacture explosive cotton is prepared with the most perfect safety. While it contains as much moisture as can be perceived by the touch, it may be put into a red hot crucible, or penetrated by a red hot poker with absolute impunity. The hiss of steam and a few sparks are the only phenomena observed.

I have next to deal with the cost of the best kind of cotton, and here it is that *in a military point of view* the chief objection arises to its use. The annexed estimate shows in detail that to prepare gun cotton from acids *as sold in Calcutta at present*, 1 pound of the *best kind* costs about 10 Rs. But being fourfold the power of powder, this may be considered as 2 Rs 8 as. for the corresponding quantity of cotton. Now this is at least 8 times the price of ordnance powder, range for range.

But on the supposition that Government made their own acids, using nitrate of soda, instead of saltpetre, economizing the washings, reconcentrating the sulphuric acid, &c. the cost of the preparation would be reduced so considerably, that allowing as above for superiority of power the cost of cotton would be 2Rs. 9as 6pie per av. pound, being within a fraction of double the price of powder, *using quantities of equal power*.* But this statement of course must be regarded as one resting

* 10 as. 4 pie for range which would be procured from a pound of powder value 5 as.

on views which further experience may modify or disprove. It would be presumptuous to advance a positive opinion that the process may not be cheapened and improved. Professor Schoenbein may have a method of greater simplicity and economy than those employed by the numerous experimentalists who have followed in the track of his brilliant discovery. I have already tried many modifications of the acid method but without success.* One plan still remains for experiment which promises better than the rest, and which I shall bring as soon as possible to the test of a conclusive trial. I allude to the employment of nitric acid previously or simultaneously submitted to the influence of a powerful voltaic current, sufficient to decompose the constituent water of the nitric acid, and thus render this more suited to the conversion of the cotton fibre into cyanic acid or cyamelide.

I have to add that I have been enabled by the kindness of Mr. Rogers and Mr. Blechynden, to make adequate trials of the Akundoo and Simal fibres—Manilla and other kinds of Hemp—Jute—Flax—Plaintain and Aloe fibre; and that I have given fair trial to every kind of cotton I could procure. I have also examined the explosive compounds made with wood shavings, saw-dust, unsized paper, &c. The general result is that cotton affords the best preparation—and the better the ordinary quality of the cotton, the stronger and more permanent is the explosive it affords.

I have also tried (but merely for trial sake) the finely divided charcoal obtained by igniting cotton in close vessels—of this carbon 100 parts of the best Banda cotton yield $17\frac{1}{2}$ to 18. As might be inferred from the theory of the process, no explosive compound was generated—no constituent water having been associated with the carbon, no substitution of a nitrogen compound could take place.

An economical mode of manufacture once discovered, which would, bring cotton and powder to equal prices, range for range,—and the use of the new explosive confined strictly to that of the very best kind,—there remains no objection which I have heard of—no fault which I have myself observed, which may not be fairly found with the best kinds of powder also. Meanwhile although the gun cotton be too costly for military use, and further experiments are required on the effects of long

* Using for instance Anhydrous nitrous acid, prepared by distilling the dried nitrate of lead—mixtures of dried sulphurous acid and nitric oxyde gases.

storing on the powers of even the best kind, I confidently recommend Mr. Siddon's preparation to the sportsmen of Bengal. Those who once try the *smokeless* cotton in a tiger encounter will not readily forego its use for this and similar purposes. I should add that it is not suited for the patent breech, but it answers admirably in the military two-grooved rifle. I have no apprehension about its alleged *bursting* properties. I have now used it with pistols and rifles, and witnessed its use with cannon and mortars to such an extent, as to warrant my expressing the most decided opinion, that regarding the best kind of cotton as 4 times the strength of powder all ordinary proportional charges may be used with but the same risk as would be attendant on the explosion of powder. The extraordinarily effective use of cotton in mining or blasting has been already proved by the extensive trials made in Europe. Here again *cost* is the only objection to be vanquished.

I should not conclude however without stating for the consolation of the powder interest that for the manufacture of rockets the cotton is apparently useless—neither would it produce the effect of powder if fired in bags against a gate, as in the memorable instance of Ghuzni; nor can it be used in the loading of Shrapnell shells.

I have now endeavoured to give an impartial account of the merits and defects of this new explosive. In the hands of the Artillery officers at Dum-Dum it could not but have met a candid and liberal trial—and although the Select Committee with myself may be but of one opinion as to the present inapplicability of gun cotton to military purposes, all must participate in the feeling that the utmost credit is due to Professor Schoenbein for his most interesting and promising invention.

TABLE

Of observations on hygrometric properties of the best kind of Gun Cotton.

The cotton used was of the finest kind, 100 grains were dried till it ceased to loose weight, were placed in the left pan of a Kater's balance, sensible to $\frac{1}{100}$ of a grain. The frame of the balance was perforated so as to allow the air to circulate freely through it.

			Remarks.
6th February, 1847.	4 p. m.	grains 100.00	
7th,	noon.	„ 100.40	
	2 p. m.	„ 100.23	
	4 p. m.	„ 100.20	

Remarks,

8th,	8 a. m. ,,	100.47	
	4½ p. m. ,,	100.25	
9th,	½ p. 7 a.m. ,,	100.60	Night cloudy, W. S.
	5 p. m. ,,	100.44	
10th,	½ p. 7 a. m. ,,	100.67	
	4 p. m. ,,	100.74	Clouded all day.
11th,	7 a. m. ,,	100.84	
	8½ a. m. ,,	100.94	Very cloudy.
	5 p. m. ,,	100.54	
12th,	9 a. m. ,,	100.90	
	5 p. m. ,,	100.64	
13th,	7 a. m. ,,	101.14	A thick mist.
	1 p. m. ,,	100.80	
	5½ p. m. ,,	100.60	Day bright.
	7 a. m. ,,	101.20	Thick mist.
14th,	noon. ,,	100.90	
	2 p. m. ,,	100.74	
	5 p. m. ,,	100.63	
	5½ p. m. ,,	100.43	House opened up a few minutes previous to observation.
15th,	7 a. m. ,,	101.07	Thick fog.
	½ p. 8 a.m. ,,	101.20	Some rain at 9 a. m.
	½ p. 4 p.m. ,,	100.43	
16th,	7 a. m. ,,	100.97	
	8 a. m. ,,	101.00	Sky overcast ; Therm. 74°.
	9¼ a. m. ,,	100.95	Occasional showers all day.
	4½ p. m. ,,	100.83	Ditto.
	5½ p. m. ,,	100.93	Ditto.
17th,	7 a. m. ,,	101.23	Clouded all day.
	8½ a. m. ,,	101.33	Ditto.
	9 a. m. ,,	101.30	Ditto.
	5 p. m. ,,	100.80	Ditto.
18th,	7 a. m. ,,	100.63	Sky bright, W. N. W.
	8 a. m. ,,	100.55	Ditto.
	5½ a. m. ,,	100.40	Ditto.
	9 a. m. ,,	100.23	Ditto.
	½ p. 9 a.m. ,,	99.96	Ditto.
	5 p. m. ,,	100.30	Therm. 74°.

Remarks.

20th,	7 a. m.	,,	100.50	Sky overcast all day. Therm. 72° 4 p. m.
	9 a. m.	,,	100.50	Ditto.
	4 p. m.	,,	100.30	Ditto.
	6 p. m.	,,	100.40	Ditto.
21st,	7 a. m.	,,	100.74	Sky bright. Wind N. E. Therm. 64°.
	9½ a. m.	,,	100.54	Ditto ditto.
	noon.	,,	100.54	
	2 p. m.	,,	100.44	Scattered clouds. Therm. 74°.
	5 p. m.	,,	100.34	Ditto ditto.
	5½ p. m.	,,	100.14	After opening of the win- dows of the house.
	7 p. m.	,,	100.24	
22d,	7 a. m.	,,	100.44	Sky bright. W. N. E. Therm. 63°.
	9 a. m.	,,	100.40	Ditto ditto.
	5 p. m.	,,	100.20	Ditto ditto. Therm. 73°.
23d,	7 a. m.	,,	100.50	Sky bright. W. N. E. Therm. 64.
	9 a. m.	,,	100.40	
	5 p. m.	,,	100.10	Therm. 74°.
24th,	10 a. m.	,,	100.90	Cloudy.
	5 p. m.	,,	100.23	Clear. Therm. 76°.
	7 p. m.	,,	100.29	Ditto.
25th,	7 a. m.	,,	100.59	Thick fog. Therm. 72°.
	8 a. m.	,,	100.53	
	5 p. m.	,,	100.23	Bright.
26th,	7 a. m.	,,	101.00	Fog. Therm. 73°.
	4 p. m.	,,	100.63	Bright. Therm. 81°.
27th,	7 a. m.	,,	101.20	Fog. Therm. 74° W. S.
	4½ p. m.	,,	100.73	Bright. Therm. 83° W. S. doors and windows open- ed just after observation.
	5 p. m.	,,	100.63	Being a loss of 00.10 in 25 minutes.
28th,	7 a. m.	,,	101.13	Fog just cleared off.
	8 a. m.	,,	101.20	Bright.

	8 $\frac{1}{2}$ a. m.	„	101.10	Therm. 73°.
	10 $\frac{1}{2}$ a. m.	„	100.50	
	11 a. m.	„	100.40	Therm. 80°.
	12	„	100.30	
	2 p. m.	„	100.30	
	$\frac{1}{2}$ p. 2.	„	100.34	
	5 p. m.	„	100.30	
	6 p. m.	„	100.24	
1st March, 1847...	7 a. m.	„	100.70	Partial clouds. W. S. W. Therm. 73°.
	$\frac{1}{2}$ p. 8.	„	100.60	Ditto ditto.
	4 p. m.	„	100.00	Ditto N. E. Therm. 84°.
	6 p. m.	„	100.20	Ditto ditto. Therm. 84°.
2d,	$\frac{1}{2}$ p. 8 a.m.	„	99.80	Bright. N. E. strong breeze. Therm. 74°.
	11 a. m.	„	99.40	
	5 p. m.	„	99.56	Ditto. Therm. 84°.
	6 p. m.	„	99.70	
3d, no observation.				
4th,	6 p. m.	„	99.50	W. N. E. Therm. 84°.

Estimate showing the actual cost of manufacturing 3 lbs. of Gun Cotton, *mixed* quality. Acids at Calcutta prices.—

Description of Articles.	Quantity.	Cost.	Total cost in Co.'s Rs.
			Rs. A. P.
Nitric Acid,.....	Tolas 651 = 17 $\frac{1}{2}$ lbs.	@ 12 as. per lb.	13 2 9
Sulphuric ditto,	Ditto 840 = 21 lbs.	@ 2 as. per lb.	2 12 3
Banda Cotton,.....	Ditto 100 = 3 lbs.	@ 16 Rs. per md.	0 8 0
			Total, 16 7 0

Equal to 5rs. 7ans. 8 p. per lb. *mixed*, = to 10. 15. 4 for 1 lb. of the *best kind*.

An estimate to manufacture 1 $\frac{1}{2}$ lb. of *best* Gun Cotton, assuming that the cost of Nitric Acid ought only to be 3 as. per lb. and that $\frac{1}{3}$ of the Acid can be recovered by re-distillation, after use. The Sulphuric Acid not to be charged, as nearly the whole of it is recovered by reconcentration.

Description of Articles.	Quantity.	Cost.	Total cost in Co.'s Rs.
			Rs. A. P.
Nitric Acid,.....	Tolas 651 = 17 $\frac{1}{2}$ lbs.	@ 3 as. per lb.	3 4 9
Sulphuric ditto,	Ditto 840 = 21 lbs.	@ Nil	Nil.
Banda Cotton,.....	Ditto 100 = 3 lbs.	@ 16 Rs. per md.	0 8 0
			Total, 3 12 9

Equal to 2 rs. 9 ans. 6 p. per lb.

Examination of some Atmospheric Dust from Shanghae, forwarded to the Asiatic Society of Bengal by D. J. MACGOWAN, Esq. M. D. Ningpo Hospital, by HENRY PIDDINGTON, Curator Museum of Economic Geology of India.

SHOWER OF ASHES OR DUST.

To H. TORRENS, Esq. Vice-President and Secretary of the Asiatic Society.
Ningpo, June 5th, 1846.

SIR,—I beg to enclose for the Meteorological annals of the Asiatic Society, the subjoined communication from Mr. Bellott, the scientific surgeon of H. M. Ship *Wolf*. I have been unable to obtain any information from men, or books, in relation to showers of ashes (such things readily escaping the notice of Chinese observers) though from the proximity of this part of the coast of China, to the volcanic chain which girts the eastern and southern shores of Asia, and the force of the N. E. Monsoon, phenomena of this description might be occasionally expected. I have however learnt from Dr. Robertson of H. C. Steamer *Nemesis* (stationed at this port) that on the day in question (viz. 15th March,) he and some other officers noticed similar appearances to those described by Dr. Bellott, vegetation being covered with sand, and parts of the vessel, and the atmosphere misty. Wind was N. E. At the time I was absent at Chusan, where I am not aware that any sand or dust was perceptible. If I may presume on an opinion I should refer the phenomenon to volcanic action, and probably emanating from Mount Fusi, on the island of Nippon, the chief of the Japan archipelago. The altitude of Mount Fusi is about 14,000 feet, and it is regarded by the Japanese with awe, and wonder. Kæmpfer says, that "Poets cannot find words, nor painters skill and colours sufficient to represent it as they think it deserves." It is subject to frequent eruptions, accompanied with earthquakes, which have destroyed vast numbers of villages. In the eruption of 1707, cinders were carried ten leagues, and ashes fell several inches thick at Dezima. The phenomenon referred to, although occurring in the remotest field of the Society's domain, is not, I think, without some degree of interest. I forward the small packet of sand transmitted to me by Mr. Bellott.

Yours very truly,

D. J. MACGOWAN.

Copy of a letter from Thomas Bellott, Esq. Surgeon R. N., Fellow of the Royal College of Surgeons, to Dr. Macgowan.

H. M. SHIP *WOLF*, Shanghae, March 16th, 1846.

MY DEAR SIR,—I transmit an account of a descent of fine sand that occurred at this place yesterday. On the 15th, the wind was N. N. E. in

force, No. 1 ; N. E. No. 2 ; E. N. E. No. 3 ; N. E. and calm at daybreak ; what was considered an ordinary mist was observed ; but those officers who walked on shore at that time, noticed their shoes and trowsers dusty. This also I experienced in the afternoon. After 8 A. M. dust was perceptible on the guns, on the upper works, and other polished surfaces on deck. I collected as much as possible ; on gathering the dust on the finger, and holding it in the rays of the sun, which consequently shone with half its brilliancy, the particles glittered, and the sand although impalpable between finger and thumb, was gritty between the teeth. The sand passed the ship in light clouds, when the light airs freshened ; it was something like smoke, but not of a blue colour. At 2 P. M. I walked three miles into the country, the whole atmosphere appeared to consist of a light brown dusty colored mist ; this was the uniform appearance the whole day. The plants were covered. The sun set, apparently more diminished in his diameter than on a frosty evening, and of a pale white, sickly hue. At 10 P. M. I spread two large newspapers to catch the sand ; they were kept spread until half past one *mediá nocte* ; yet although the sand descended and lay on the guns, none fell on the paper ; whether from electric attraction or not I do not know. The stars, although the sky was cloudless, Ursa Major in the zenith, were dimly visible. The moon three days past her full was partially obscured, and cast a very faint shadow on my hand ; at *one mediá nocte* the moon and stars resumed their usual appearance, and at half-past one the Quarter Master observed "it was all over." The Barometer 29. 88, from 30 inches.* If you breathed it through the mouth the sand gritted between the teeth. The entire surface of this district is alluvial clay, without pebble, or sand ; the nearest sand (coarse and shelly) is 12 miles distant. It was said that the merchantman *Denia* fell in with this descent of sand 308 miles from any land, in the direction of Loo-choo, and also pumice stone was floating. As I did not see her log, I do not certify this fact.

Yours sincerely,
J. BELLOTT.

D. J. Macgowan, Esq. M. D. Ningpo.

P. S.—I forward a little of the sand.

I should premise that the entire weight of the minute specimen of this dust forwarded to us did not exceed $1\frac{1}{2}$ grains, so that all the experiments are performed with less than pin-head specimens, but chemists well know the accuracy with which these microscopic experiments can demonstrate the presence or absence of certain elements, and from

* So in MSS. I presume that what is meant is, that the Barometer *fell* to 29.88 from 30.00 ?—H. P.

the details can judge at a glance if they have been correctly and carefully performed. This is necessarily mentioned because I could only sacrifice such exceedingly minute assays, and have thus been obliged to refrain from further researches, as for example its specific gravity, the proportion of animal to mineral matter, and the hygrometric qualities of the dust, all of which, with many other points, it would be very satisfactory to know. I am in hopes however that I shall receive a report, with specimens, under the Admiralty order to H. M. Ships on the Eastern Station to report on Storms, in which other Meteorological phenomena are I presume included.

The dust is an olive grey powder, cohering much together, like the scrapings from a paper filter, and when viewed with the magnifier is evidently mixed with something like hairs of two kinds, black and rather thick white ones. Under the microscope it is evidently a congeries of very short transparent white, black and brown hairs or fibres, with some reddish, strait spines, and grains of pellucid quartz-like sand adhering amongst them. There was one small grain like a seed, but hard, which when viewed carefully appeared to be an earthy concretion. I unfortunately lost it and could not thus try it at the blowpipe.

It just '*grits*' under the nail on glass, and rubbed between two glass surfaces scratches them but very faintly, felting into a smooth mass from the quantity of fibre. I *think* the taste is slightly saline, but in the very minute quantity taken cannot be sure. Moistened on turmeric paper it distinctly reddens it and is thus alkaline, and contains probably the sub-carbonate of soda, the commonest of the alkaline salts.

Blowpipe Examination.

On platinum foil: held over the lamp it flames up, the fibres are burnt with a strong ammoniacal odour, and a grey coherent powder, like punice, remains.

2. *On platinum foil alone: before the blowpipe;* this powder fused in the reducing flame but at one point only* and not at the detached portions. The fused part is a bottle-green glass, and when detached is found to have made a little circular hole in the platinum, undoubtedly from an alkali contained in the assay.

* Probably at one of the minute concretions noted above, and which are not remarked by the naked eye.

3. *The fibres*, which one would assume to be capillary obsidian, if we supposed the dust volcanic, are not so, but apparently animal! burning up with the common ammoniacal smell and smoke of burnt hair or feathers.

4. *On charcoal* the assay burns up as before, leaving a coherent, olive-grey, granular mass like pumice, which is infusible.

5. *With Soda on charcoal* this fuses to a reddish, dark grey, opaque and pearly bead with violent spitting and throwing up of little globules.

6. *When to this bead is added an equal quantity of Borax*, it fuses on Platinum wire to a transparent bright and colourless, but crackly glass, which is slightly green while cooling.

As far then, as physical and chemical characters are concerned, we may call our dust a congeries of light downy fibre or hairs with silex adhering to them and an admixture of an alkaline salt! It appears from Dr. Macgowan's and Dr. Bellott's letters that the mist and dust certainly extended on the same day from Ningpo in about 30° N. Lat.; to Shanghai in $31\frac{1}{2}^{\circ}$ N. (I use round numbers here) which gives 90 miles of difference of latitude, and that it was noticed with light winds from N. N. E. to E. N. E. from 8 A. M. to 1 A. M. or for 17 hours. Now if we take it to have moved only at the rate of $2\frac{1}{2}$ miles per hour, as "the sand passed the ships in light clouds," says Dr. Bellott (and this is the slowest rate we can assign to moving clouds,) this would give $17 \times 2\frac{1}{2}$ or 42 miles in length for it, and without noticing the difference of longitude between Ningpo and Shanghai, which are nearly N. W. and S. E. of each other, we may say that the difference of latitude, 90 miles, was the breadth. We have thus $90 \times 42\frac{1}{2}$ or 3825 square miles for its extent!

Where could a cloud of 3800 square miles of fibres, alkali, and sand (for this it was by the specimens before us) come from?

We have seen that it is not in the least volcanic, its animal nature putting this wholly out of the question, and all the volcanic dusts upon record are for the most part fusible and pulverulent (like pumice or obsidian) while the residuum of ours is perfectly infusible—for the little globules are, as I have stated, properly the only fusible parts, being the alkaline concretions. I shall now proceed to show that though the wind was *from* the N. E. and the phenomena occurred while the N. E. monsoon was yet blowing, that in all meteorological probability the dust did *not* come from the N. E. but from the N. W. or W. N. W.

For it is now a well recognised fact that the higher currents of the atmosphere are north, say at the polar circles, and become north-westerly and gradually westerly as they approach the equator, although the trades are easterly and the monsoons alternating in their direction, and we know also that volcanic ashes and other light matters are often carried from the west to the eastward by this great upper stream of westerly wind. The fall of the ashes of the volcano of Cosseguina at Jamaica in 1835, 800 miles to the North-East of it and consequently directly *against* the trade-wind, is a decisive instance of this* and I do not mention others for brevity's sake.

We are assured moreover that our dust must have come from the land by its semi-animal constituents, and that it must have come therefore originally from some quarter to the westward of the meridian of Ningpo, for to the eastward is the ocean, and as it was brought down by a north-easterly current below, that it must have come from the northward. In the north-west then seems the most probable direction to suppose it was originally carried into the atmosphere, as I shall presently show, that it is improbable it could have come from Corea or Japan. We may also note here, that Dr. Macgowan himself certifies that no dust fell at Chusan, where he was; Chusan lying north-east of Ningpo. Hence it was either too high to fall there or it came at least from the north-west. The report of the ship I do not notice here, her position being uncertain, and no time given, and Loo Choo bears about South-East from Shanghai, which would make the dust come from the N. W.

The volcanic ashes and dust are, it is always supposed, and this is most probable, projected far enough into the atmosphere, or carried up by the whirlwinds which volcanic eruptions undoubtedly create, high enough to enter the upper currents of the winds, but volcanic action is out of the question here, and we must look for other causes.

Frogs, fish, seeds, pollen, &c. are well known to have been carried up by whirlwinds and horizontally to great distances by currents of air before their fall, and on a larger scale we have the fine dust of the Sahara, which is often carried up and falls far out at sea about the

* Ashes from the same volcano fell also on board H. M. S. *Conway*, in the Pacific, 1200 miles to the westward of it. Jorullo, Tuxtla and St. Vincent, are cases too well known to be detailed, of ashes carried to the N. E.

Cape de Verd Islands. There is nothing extraordinary then in supposing that this dust was originally raised by some such cause as a great storm or whirlwind, and that it might be carried by the superior current to a very great distance before it fell. It was probably also raised in a very dry state, and one cause aiding its fall might be the absorption of the humidity of the air as it approached the ocean, hair being highly hygrometric, and hence the difficulty of supposing it to have crossed any great extent of sea, as it must have done to come from Corea or Japan. It is evidently, by Dr. Bellott's description, so light that (which appeared to him very unaccountable), it obeyed strictly, like a part of the atmosphere, the laws which regulate the deposition of dew; for it was deposited on the guns and other quickly radiating bodies but "would not settle" on his newspaper! He forgot that the paper, being a non-conductor of the highest order, prevented the radiation from the deck in that part, and thus keeping it at a little higher temperature prevented the depositing of the dew, which in this case was carrying the dust with it.

It is a startling thing to say, and I do it with all caution, but it is quite within the limits of possibility, if not of probability, that this dust came originally from the steppes of Tartary! and the presence of an alkaline salt in it is no small addition to the probabilities. The nearest part of Mongolia without the Great Wall is only about 675 miles from Shanghai, a distance to which a light mass, half dust and half fibre, might easily be carried, especially if raised as it would be there, in a perfectly dry state; the dry winds of Tartary, and the Pak-fung or dry north wind of China which splits and cracks up in an hour the most seasoned wood work, are well known.

P. S.—Since this paper was written, the dust has, through the kind assistance of Dr. Cantor and Mr. J. W. Grant, C. S. been examined by much more powerful microscopes than I possess, and these gentlemen, together with Major Munro, pronounce the fibres to be *Confervæ*, and not hair. Some of these bodies may afford the ammonia in combustion of which the smell is so strong and distinct as to lead us to suppose, without this correction, that the fibres are hair.

Assuming then these to be *Confervæ*, we have to the North-Eastward as before, Japan and Corea; and to the Westward and North-Westward the Poyang, Tai-you, Hong-tze and other great inland lakes

of China, some or most of which are shallow (*jheels*!) and might furnish vast quantities of remains of confervæ on their inundated banks and flats.

In a paper by Mr. Darwin in the Journal of the Geological Society for 1845, on the fall of the Fine Dust in the Atlantic, which had escaped my notice and which Mr. Laidlay has been good enough to point out to me, mention is made not only of small but of coloured particles of stone $\frac{1}{1000}$ th of an inch square, with some few a little larger, and much fine matter; but all the dusts examined by Mr. Darwin fuse under the blowpipe. Professor Ehrenburg finds that this dust contained no less than sixty-seven forms of Infusoria, that is of their siliceous tissues, but none of the soft parts remain. We may observe too that the whole of the dust falling on the Eastern side of the Atlantic comes from the neighbouring shores of Africa.



PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FEBRUARY, 1847.

The usual monthly meeting was held at the Society's house on Wednesday the 10th of February.

The Hon'ble Sir J. P. Grant, in the chair.

The minutes of the preceding meeting having been read by the Senior Secretary—

Major Marshall objected to the manner in which vacancies in the Committee of Papers had been filled up at the last meeting, and said that election lists for all office-bearers ought to have been distributed. He then moved for a new election of all officers of the Society.

The Senior Secretary stated that it had been the practice of the Society for the past twelve years to do as had been done at the last meeting.

Major Marshall still pressing his proposition, it was moved by the Lord Bishop, seconded by Colonel Forbes, and carried with but one dissentient voice, that at future annual elections lists for *all* office-bearers be distributed according to the early practice of the Society.

The minutes of the January meeting were then confirmed.

The following gentlemen were ballotted for, and duly elected members of the Society :—

Capt. W. Munro, Brigade Major, Fort William ; Capt. Ouseley, Assistant Political Agent, N. W. Frontier ; Baboo Hurreemohun Sen ; R. Jones, Esq. Hindu College ; J. Muller, Esq. Mint ; Baboo Debendernath Tagore, and W. M. Dirom, Esq. C. S.

The following gentlemen were proposed as candidates for election at next meeting :—

The Rev. William Keane, A. M. of Emanuel College, Cambridge, proposed by the Lord Bishop, seconded by Dr. O'Shaughnessy.

H. Thornhill, Esq., C. S. proposed by G. A. Bushby, Esq., seconded by Col. Forbes.

H. Newmarch, Esq. Professor, Hindu College, proposed by Mr. Hcatley, seconded by Dr. O'Shaughnessy.

E. Linstedt, Esq. proposed by Mr. Blyth, seconded by Mr. Laidlay.

Baboo Dwarkanath Bose, of the Royal College of Surgeons of London, proposed by Dr. Stewart, seconded by Mr. Blyth.

W. Kerr, Esq. Principal of the Hindu College, proposed by Dr. O'Shaughnessy, seconded by Col. Forbes.

Lieut. Douglas, Bengal Artillery, proposed by Captain Broome, seconded by Dr. O'Shaughnessy.

Baboo Debendernath Tagore, proposed by Dr. O'Shaughnessy, seconded by Mr. Laidlay.

Rev. A. Sandberg, of Benares, proposed by Rev. J. Long, seconded by J. Ward, Esq.

The Senior Secretary handed in the accounts of expenditure, and receipts, with cash vouchers for the month of January, which were directed to remain on the Library table for general inspection till next meeting.

Read the following letter from Capt. Rigny, Bengal Engineers.

To the Secretary of the Asiatic Society, Calcutta.

Cuttack, 26th January, 1847.

SIR,—I have the pleasure to enclose copy of an inscription from a stone exhumed, a few days since, from the ruins of the stone revetment against the Kajoorey ruin, a work to which the city of Cuttack owes its continuance, for a period probably but little short of that of its existence.

The work was so seriously damaged during the last rainy season, as to render necessary the preparation of an estimate for a new line of works, giving temporary repairs merely to the old one; and it was in clearing away the ruins for the latter purpose that the stone came to light. From its position when discovered, it would appear to have been concealed, by a facing of stone given subsequently to the work in which it had been fixed as a record.

I may add that the letters on the stone (a basalt) are as sharply defined as if cut yesterday.

I shall be greatly obliged by your favoring me with a translation of the inscription.

I remain, Sir,

Your obedient Servant,

H. RIGNY, *Capt. Engineers.*

اغاز این عمارت در اواخر زمان دولت بادشاه جنت بارگاه نورالدین محمد جهانگیر بادشاه طیب الله ثراه صورت پذیرفت و اتمام آن در اوایل او آن خلقت ابدقران بادشاه عالمیان پناه ابوالمظفر شهاب الدین محمد صاحب قران ثانی شاهجهان بادشاه غازی و سال یک هزار و سی و هفت هجری سمت وقوع یافت و بانی این اساس بنده درگاه محمد باقرخان نجم ثانی بلده باقرآباد •

TRANSLATION.

The foundation of this building was laid at the close of the reign of the king of heavenly court, Nooruddeen Mohummud Jehangeer Badshah. May sanctity attend his resting place! and it was completed during the commencement of the reign (may it be perpetual) of the king of the world, father of victory, star of religion, Mohummud, second Lord of felicity, Shah Jehan Badshah Gazi, in the year 1037 Hijri, by a servant of the court, Mohummud Báker Khan Nujumussani,* inhabitant of the city of Bákerábad,—Architect.

Read the following extracts from a letter from Capt. Kittoe, to the Senior Secretary.

“*Sherghatti, 29th January, 1847.*”

“By this day’s dawk I have forwarded a packet of impressions and copies of inscriptions to Mr. Bushby’s office, so pray send there for them that they may be in time for this meeting. I have kept back a good many, wishing to prepare them properly.

“I have I find, four of the most ancient inscriptions, more than had hitherto been noticed, being three from one place and three from another; the first three only differ in the initial name; the next are a pair (with the same difference) and the third entirely so. They are all unluckily mutilated; the pair have the same three letters struck out of each, and the quaint sentence ‘Bodhist likha’ in an ancient Sanscrit type. This has been translated by Prinsep as Bodhisool बभिसुल. It is certainly as like the one as the other; my version is ‘Writing of Budhists’—his ‘the root of the Bo-tree;’ in another sense the ‘root of knowledge,’ the letters of the ancient writing have evidently been hammered out purposely. I have satisfactorily made out so much of the sentence, ‘The beloved raja in the 12th year of his reign caused this cave,’ &c. &c., but I am forestalling a long article I propose editing on the caves. Suffice it to say that I am inclined to give far more remote date to these inscriptions than has been hitherto accorded. I believe the ‘Dasarath’ named to be the identical person of ‘Puranic’ fame, the father of Ram, and that ‘Devanam-piya-dasa raja’ is only a title common to the Gupta rajas and those preceding. Oh, that poor James Prinsep were alive to enjoy the discoveries I have made, how we could have helped each other.

* “A second Luminary.”

"I am preparing tinted drawings on a good-sized scale of all my Buddhist sculptures. It is however hard work. In sketching very fast, I draw more in one day than I can copy and finish up in three or four. I go to the caves again to-morrow; it is 36 miles hence. I hope to have all ready for March meeting, when I shall be in Calcutta myself in all probability."

The inscriptions and paper were laid before the meeting and referred to the Committee of Papers for examination.

Read a letter from Mr. Secretary Melvill.

No. 73, of 1847.

From P. MELVILL, Esq. To the Secretary to the Asiatic Society.

Fort William, the 23d January, 1847.

SIR,—I am directed by His Honour the President in Council to transmit to you, for such notice as the Society may deem it to merit, the accompanying copy of a Journal of a Steam trip to the north of Bagdad, by Lieut. J. F. Jones of the Indian Navy, together with the sketches therein alluded to, which you will have the goodness carefully to return to this office.

I have the honor to be, Sir,

Your most obedient Servant,

P. MELVILL,

Officialing Under-Secretary to Government of India.

The document and drawings were referred to the Committee of Papers.

Read a letter from the Secretary to the Superintendent of Marine, forwarding Meteorological registers from Kyook Phyo.

Read a letter from the Rev. Dr. Hæberlin respecting his edition of the *Smritis* now in course of publication.

(See Report on Society's affairs inserted in Jan. number.)

The Senior Secretary having communicated a proposition from the Committee of Papers recommending that Dr. Hæberlin's offer be accepted,

It was resolved unanimously that the Asiatic Society subscribe for 100 copies of each Vol. of the *Smritis*, the amount to be paid from the Oriental Fund.

Read a letter from the Baron Melvill de Carnbee, dated the Hague, 21st December, forwarding eight numbers of the *Moniteur des Indes* for the Society's acceptance.

A Monsieur le Secrétaire de la Asiatic Society de Calcutta.

MONSIEUR,—Je me rappelle toujours avec plaisir, Monsieur, que lors de mon court séjour à Calcutta, de Mars 1845, j'eus l'extrême honneur et avantage de faire

vosre connaissance. J'étais alors en voyage de Java en Europe, et je me serais arrêté plus longtemps en Bengale pour des recherches Scientifiques, si le choléra ne m'eut fait changer subitement de plan. Après avoir éprouvé une attaque de cette maladie et avoir perdu mon domestique européen, j'avoue que je me comptais très heureux de m'embarquer, sain et sauf, à bord de l'Hindostan. Cependant, avant mon départ j'avois eu le temps de m'acquitter d'une commission dont j'étois charge par la Société des Arts et des Sciences de Batavia aupres de la Societe asiatique de Calcutta, ayant pour but de nouer des relations ét d'établir une correspondance entre les deux Sociétés ci dessus nommées. Je fus assez heureux d'emporter la conviction quel'on partageait à Calcutta nos vues quant à l'utilité d'un tel rapprochement, et cela me fait conjecturer que mes démarches aient eu le résultat espéré.

Quelques mois après mon retour en Hollande, étant placé au Ministère de la Marine pour achever mon ouvrage sur l'hydrographie de l'Archipelago indien, j'ai fondé en même temps, de concert avec M. de Siebold, auteur de differens ouvrages sur le Japan, un journal, traitant des colones Néerlandaises au Asie et en Amérique, sous le titre de *Moniteur des Indes*, etc. J'ai l'honneur, Monsieur, de vous faire parvenir par le présent *mail* les huit premiers numéros de ce journal, espérant que vous daignerez bien les presenter, de ma part, à votre Société comme une faible temoignage de ma profonde estime.

Je serais heureux si le but et l'exécution du *Moniteur des Indes* peuvent obtenir les suffrages de votre Société et que dans ce cas Elle voudroit bien, par sa puissante influence, en favoriser le succes en Bengale.

J'ai l'honneur d'être, avec une parfaite estime Monsieur,

Votre devoué serviteur,

BARON MELVILL DE CARNBEE.

Hollande, La Haye ce 21 Décembre, 1846.

The Senior Secretary submitted the annexed recommendations by the Committee of Papers.

The Committee having considered Dr. Roer's representation of the total incapacity of the Pundit, recommend his being dismissed.

With reference to a letter from H. M. Elliott, Esq. desiring to have certain MS. from the Library sent to him to Agra on depositing the value thereof.

The Committee deeming it impracticable to assign a value to MS. and considering these exposed to great risk of loss or injury in transit, regret they cannot advise compliance with Mr. Elliott's wishes, but they will gladly direct any assistance to be given at the Society's cost by having MS. or extracts therefrom copied by the Library establishment for his use.

The Committee submit a proposal from Mr. Frith for the patronage of the Society to a projected work by Mr. Doubleday on Diurnal Lepidoptera, and recommend that the Society subscribe for two copies and advertise the work gratuitously on the cover of the Journal.

Mrs. Ballin having applied for orders to colour 14 sets of the Burnes' drawings already lithographed and which Mrs. B. states are in danger of spoiling—and it having been ascertained that the cost of colouring the said drawings would be Rs. 1,379 12 annas, the committee advise that no further outlay be made on this account.

All which propositions were unanimously agreed to.

The Report on the Society's affairs, read at the January meeting and subsequently printed and circulated to resident members, having been brought up, was briefly discussed, and a few verbal or typographical alterations having been suggested and agreed to, the Report was unanimously adopted and the propositions it contains thereby voted as rules of the Society. The Report is published in the January number.

The Librarian submitted the usual list of donations, purchases and exchanges.

PRESENTED.

- 1.—Meteorological Register, kept at the Surveyor General's Office during the month of December, 1846.—FROM THE SURVEYOR GENERAL'S OFFICE.
- 2.—Meteorological Register, kept at Kyonk Phyo, during December, 1846.—BY THE SUPERINTENDANT OF MARINE.
- 3.—The History of the British Empire in India, by E. Thornton, Esq., vol. VI.—BY THE BENGAL GOVERNMENT.
- 4.—The Calcutta Christian Observer for February, 1847.—BY THE EDITORS.
- 5.—Report of the Managing Director to the Board of Directors, &c. of the East India Railway Company, with a map.—BY THE COMPANY.
- 6.—Theodori Gulichni Johannes Juynboll, Commentaria in Historiam Gentis Samaritanæ.—BY THE CURATORS OF THE ACADEMY OF LEYDEN.
- 7.—The Banks of the Bhagirathi.—BY THE REV. J. LONG.
- 8.—Analysis of the Abbé Dubois' Description of the character, manners, and institutions of the people of India.—BY THE REV. J. LONG.

EXCHANGED.

- 9.—Journal Asiatique, quatrieme serie, Nos. 35,—6 and 7.
- 10.—The London, Edinburgh and Dublin Philosophical Magazine, No. 195.
- 11.—The Quarterly Journal of the Geological Society of London, No. 8.

PURCHASED.

- 12.—The North British Review, No. XI.
- 13.—Journal des Savans for September, 1846.

- 14.—The Annals and Magazine of Natural History, No. 120.
- 15.—The Shah Nameh of Ferdusi, in Oordu verse, by Munshi Moulchund Lucknavi, 4 copies.
- 16.—Gunje Kubii, or an Oordu version of the Akhlak Mohuseeni, 4 copies.
- 17.—The Akhwán ul suffá in the original Arabic, 4 copies.
- 18.—Ditto in Oordu, 4 copies.

Read the subjoined report by Mr. Laidlay on the investigations referred to the Society regarding the Ajunta caves. The Report was directed to be submitted to the Committee of Papers.

Report upon the Committee of Antiquities.

Having been honoured at the meeting of December with the command of the Society to report upon the proceedings of the Committee of Antiquities, I lost no time in searching for such documents and correspondence connected with the subject, as might be available: but great delay having occurred in obtaining these, it was not till a few days ago that I was in a position to form any estimate of what that committee had done.

The Committee of Indian Antiquities was appointed, as all present are doubtless aware, in consequence of a communication from Government requesting the assistance and suggestions of the Society in devising the best means of preserving and publishing to the world the interesting monuments of Antiquity scattered over India generally, but more especially and immediately the invaluable paintings and inscriptions in the caves of Ajunta, which from their peculiarly perishable character, claimed the earliest efforts to rescue them from impending destruction.

This communication from so high and influential a quarter, was hailed with enthusiasm by the Society, as presenting not merely the highest encouragement to continue and extend a favourite pursuit, which had already reflected great lustre upon its past history, but also as a rare opportunity of doing so under the auspices of Government, pledged, in a manner, to assistance and co-operation. The Committee in question was appointed accordingly, and its members,—such at least, as like Messrs. Webb, Heatley, Kittoe and Latter, felt earnest on the subject,—entered at once upon their functions with ardour worthy of the Society's best days. The means of preserving and of delineating the precious remains of Ajunta, were discussed in a series of most able minutes, in which,—each member viewing the subject through the medium of his own predilections—a mass of varied and instructive matter was thrown together, which it were well to preserve for the guidance of all such as have kindred researches to prosecute.

But here, I regret to say, the labours of the Committee appear to have terminated! I have not been able to discover that any *active* measures were ever founded upon the suggestions offered in these minutes, or indeed that the Committee ever even met to adopt these or any other means of fulfilling the object of their appointment!

How deeply this indifference is to be deplored may be gathered from a single fact recorded by Dr. Allan Webb, that the invaluable remains of antiquity at Ajunta are daily, nay hourly, being lost to the world, not merely from the inevitable effects of time and exposure, and from the absence of all measures to preserve them, but from the worse than Gothic barbarism of casual visitors, who wantonly destroy the fresco or remove it in fragments for the gratification of the most idle and depraved curiosity ! “ Whole yard-lengths of the painted or written inscriptions, says Dr. Webb, were *lying in water on the floor*, but were still legible when I visited these temples in 1836. If therefore written records be most valuable, as the Vice-President and Secretary of the Asiatic Society seem to consider them, how important to lose no time in securing these precious records ! *The rude boar spear of the hunter, or the Gothic curiosity of some casual visitor will strip whole walls for some one favourite head ! I have found in Bombay whole groups that had thus been despoiled !*”

Painful as it is to listen to such details as these, it is yet more so to reflect that on their communication, no active measures were taken by the Committee to stay the work of destruction ! The mouths of the caves are stated by Dr. Webb, to be nearly closed with rubbish, which both directs the water into them and prevents its exit ; and the removal of this at once was strongly urged as the first measure of preservation that should be recommended for the adoption of Government. I am not aware, however, that even this suggestion was acted upon !

Let us not however, dwell with vain regret upon time and opportunity lost, but rather arouse our energies to immediate exertion worthy of the Society that has already achieved so much in Indian archæology. The question for us this evening to consider is, what can be done now ? And though for the most part made in reference to the peculiar case of the Ajunta caves, there are suggestions in the minutes of the Committee which, I humbly conceive, the Society cannot do better than act upon *at once*. Amongst these the recommendations, that a duly qualified person be deputed by Government to make accurate drawings of the painting, sculpture, inscriptions, and other remains of antiquity scattered throughout the country, and to adopt such measures as may seem essential, for the better preservation of such objects henceforward, is one so obviously appropriate that the Society will, I think, concur in approving it. This point has been very fully considered in an able minute by Captain Kittoe, who I need not remind the Society has already distinguished himself by his zealous and indefatigable antiquarian researches, to which the past volumes of the Society’s Journal bear ample and lasting testimony. This officer concludes an excellent minute evincing great knowledge of the subject combined with untiring zeal, by proffering his personal services through the Society to Government, for the investigation and delineation of all objects of antiquarian interest wherever found ; a field too vast, perhaps, as sketched by himself, for any single individual, however energetic ; but to a portion of which his talents and zeal might undoubtedly be directed with the happiest results.

That Captain Kittoe’s offer was not acted upon, arose I believe, in part from the circumstance of that gentleman having been appointed soon after to a very important

office, and in part from a feeling of delicacy entertained by the Committee in interfering in any way with the patronage of Government. But certain it is that it were no easy matter to find a person better qualified by taste, experience, and skill for the congenial task he here volunteers. Whether the services of this gentleman are still available, I have no means of knowing: but if so, it may be left to the meeting to consider whether a representation to the foregoing effect should still be submitted to the Government, or what other measures should be adopted to carry out the wishes of the Hon. Court of Directors as expressed in their letter to the Governor General in Council, 29th May, 1844.

The caves of Ajunta are now indeed, under the orders of the Madras Government, being satisfactorily investigated; but the field is yet vast, and with the Society will remain the credit of having improved, or the discredit of having neglected so fair an opportunity of promoting at once its objects and its reputation.

Before concluding this report, I may be allowed perhaps to observe, that the present neglect of Indian Archæology may in a very great measure be ascribed to the interrupted publication of the Society's Journal. For many months little has been known of our proceedings beyond these walls: not to the public only, but to distant members and contributors, have these been a sealed book; a circumstance eminently unfavourable to pursuits such as our's, mainly dependent as they are, upon the free-will offerings of widely-dispersed contributors. This defect will, it is hoped, be remedied henceforward: the arrears of the proceedings have already been brought up, and we may hope to be able in a few weeks to produce a monthly number of the Journal with tolerable regularity.

J. W. LAIDLAY,

Co-Secretary.

10th February, 1847.

Mr. Blyth submitted the following Report on the progress of the Zoological department during the preceding months.

Report for the months of December, 1846, and January and February, 1847.

SIR,—Having been absent upon an excursion to explore the jungles N. and W. of Midnapore, at the period of the January meeting of the Society, and the pressure of business at the December meeting having necessitated the postponement of the reading of my report for that occasion, I have now to bring before you the results of three months' gatherings, and can scarcely, within moderate compass, do justice to the contributions of our numerous supporters.

1. From the Barrackpore menagerie, I have to acknowledge having received the carcass of a particularly fine female Giraffe, the skin of which is in process of being set up as a stuffed specimen, while the skeleton has likewise been preserved. Also that of a Kangaroo, that has in like manner been prepared as stuffed skin and skeleton.

Two other large animals that have been mounted as stuffed specimens during the past month, are a young Bull Gayal (*Bos frontalis*), which I have the pleasure of presenting to the Society, and the male Saumer Deer (*Cervus hippelaphus*), which had been living for some years in the Society's compound.

2. From R. W. G. Frith, Esq., and

3. From Mr. E. Lindstedt, large and valuable collections of mammalia and bird skins from the Malayan peninsula. These collections have left scarcely a species of the two classes mentioned, known to inhabit that peninsula, of which the Society still requires specimens; and they have contributed a good deal to our knowledge of the rich zoology of the country in question. As some of the desiderata which these collections have supplied us with, may be enumerated—among mammalia, a very fine series of the *Hylobates lar*, also *Presbytis femoralis*, examples of the Marten referred to *Mustela flavigula* in Dr. Cantor's list (xv. 194), and some murine skins,—and of birds, *Buceros comatus*, male and female, *Bucco quadricolor*, *Gecinus rubiginosus*, *Tiga Rafflesii*, series of *Centropus eurycercus*, *Chaptalia malayensis*, *Brachypodius criniger*, A. Hay, (xiv. 557), *Malacopteron majus*, n. s., *Orthotomus edela*, and *Rhizothera longirostris*, m. and f. Some fishes also are comprised in Mr. Frith's collection, pertaining to the genera *Serranus*, *Mesoprion*, and *Muraenesox*, and a *Monitor* (vel *Varanus*) in that of Mr. Lindstedt, as also a small *Crocodylus biporcatus*.

4. The Rev. J. Barbe, to whom we have been repeatedly indebted for valuable donations, has now presented us with a considerable number of specimens, chiefly of birds, collected in the Tenasserim provinces, Penang, and Malacca. From the first named locality, Mr. Barbe has brought a third undescribed species of Squirrel (all from the provinces,) for which we are indebted to his exertions; and from Penang the *Crypsirina varians* (or *Phrenotrix temia*, Horsfield), the male of *Philentoma plumosum* and other species of much interest.

5. Mr. O'Ryley, of Amherst, has favoured the Society with an extremely interesting collection of mammalia, birds, reptiles, &c. from the Tenasserim provinces: among which may be noticed the skin of the head of an old female *Rhinoceros sumatranus*, with the horns perfect, and which I have had properly stuffed; also fine specimens of an undescribed Squirrel; and among birds, two examples of the *Eurynorhynchus griseus* (vide *As. Res.* vol. xix, pt. i, p. 69. and pl. ix), which has hitherto been considered one of the rarest of the feathered class, but which appears to be of very common occurrence on the Tenasserim coast, as I am assured by Mr. Barbe and others. Mr. O'Ryley has sent also a Teesa Hawk, which seems to be the *Poliornis fasciatus* of Lord Arthur Hay, *Madras Journ.* No. XXXI, 146 (but, if so, very doubtfully distinct from *P. teesa*), a Bulboul, which is the representative of *Pycnonotus hamorrhous* of Arracan; some rare snakes, &c. &c.

6. Mr. F. Skipwith, C. S., has likewise sent us, from Chittagong, an example of the *Eurynorhynchus*, a species which I hope soon to obtain in abundance from Mr. O'Ryley, and so ascertain its seasonal variations of colouring, as well as to receive replies to my various inquiries respecting its habits and mode of life.

7. From Capt. Phayre, the Society has been presented with a large collection of Arracan specimens, chiefly birds, of which the most remarkable is a very large species of *Iora*, in all probability that alluded to in Vol. XIV, p. 602, of the Society's Journal.

8. Major Jenkins has obliged us with numerous specimens of reptiles, insects, &c. preserved in spirit, from Assam.

9. Mr. Thorburn, of Goalpara, has presented the Society with a collection of birds, reptiles, fishes, &c. from that vicinity.

10. From Dr. R. Templeton, of Colombo, we have received a fourth case of Cinghalese specimens of mammalia and birds, comprising various objects of much interest in those classes, and several novelties which I intend to treat of elsewhere; merely mentioning now that Dr. Templeton has sent a second and new species of Jungle-fowl from that island (*Gallus lineatus*, nobis), additional to the *G. Stanleyi* of Hardwicke's illustrations—which latter has, I believe, been first verified from an actual specimen, previously transmitted to the Society by the same gentleman.

11. Capt. Boys left with us, for the Society's museum, a few specimens of birds procured on the route to Calcutta from the Upper Provinces, and the skull of a *Gavialis* from the Ravee river, flowing into the Indus.

12. Mr. Birch, of the Pilot service, continues to collect for our museum such specimens of fishes, crustacea, mollusca, &c. as he can procure in the course of his professional trips to and from the Sandheads.

13. Mr. T. H. Duncan, has sent to the museum a living specimen of *Strix flammea*.

14. Dr. Gurney Turner, of Midnapore, obliged me, when I visited that station, with some Hornhills, snakes, &c. for the Society's museum.

15. O. W. Malet, Esq. Magistrate of Midnapore, also favored me with a magnificent pair of Saumer horns, from Cuttack.

16. From Sir William Jardine, Bart., the Society has received a small collection of British birds, including some that are very acceptable; among which I may mention the common English Sparrow, which I had long wanted to compare with its Indian representative.

And I may conclude by remarking that during the month that I was absent from the museum, I collected above 60 skins of mammalia, (including of course the small species,) 273 of birds, and numerous reptiles, &c.; many of which are either quite new to the museum, or have replaced very inferior specimens of the same.

To treat in detail of these various acquisitions, would require more time and leisure than I can at present command; but the results I hope to embody in future contributions, and indeed have already incorporated some of them in papers which are awaiting publication.

I have the honor to be, Sir,

Your obedient servant,

E. BLYTH.

P. S. The large amount of duplicates that have accumulated during the last few months, have for the most part been distributed in collections now ready to be forwarded to the Hon'ble Company's Museum, to that of the Christiania University, that of the Society of Arts and Sciences, &c. of Boston, United States, and that of the Manchester Institution.

I have the pleasure also of presenting, on my own account, some purchased specimens of rare Himalayan mammalia and birds, of species which I have long required for examination and frequent reference.

For all the above communications and donations the thanks of the Asiatic Society were unanimously voted.

For use in Library only

